1 OCT 1971

PART B DISCHARGE DESCRIPTION

(Note: Submission of Part B is required of all applicants who are also required to submit Part A. Only those parameters specifically indicated in the instructions are to be reported by a particular industry)

(Office use only) 000205

Discharge Serial No. 000205 - 001

B-1. PHYSICAL AND BIOLOGICAL PARAMETERS OF INTAKE WATER AND DISCHARGE (See Table B-1)

	Intake		Discharge					
PARAMETER AND CODE	(1) UNTREATED INTAKE WATER	(2) TREATED INTAKE WATER	(3) AVERAGE (DAILY)	(4) MINIMUM (OPERATING YEAR)	(5)[a] MAXIMUM (OPERATING YEAR)	(6) SAMPLE FREQUENCY	(7) CONTINUOUS MONITORING D
COLOR 00080	12	2	2.6	X	4	0	A
SPECIFIC CONDUCTANCE 00095	375	350	9,200	8,500	9,800	0	A
TURBIDITY 00070	1.4	3.5	3.13	X	7.5	0	A
FECAL STREPTOCOCCI BACTERIA 74054	ND*	ND	ND	X	ND	0	A
FECAL COLIFORM BACTERIA 74055	ND	ND	ND	X	ND	0	A
TOTAL COLIFORM BACTERIA 74056	16	ND	ND	X	ND	0	A

*Not Detectable

SCM

000404

OCT 1971

PART B

(Office use only) 00020

Discharge Serial No. 000205 - 001

B-2. CHEMICAL PARAMETERS OF INTAKE WATER AND DISCHARGE (See Table B-2)

	Intake		Discharge									
PARAMETER AND CODE	UNTREATED INTAKE WATER (1)	TREATED INTAKE WATER (2)	MAXIMUM CONCENTRATION (3)	MAXIMUM POUNDS PER DAY PER PROCESS UNIT (4)	MAXIMUM POUNDS PER DAY (5)	DAILY AVG. CONCENTRATION (6)	AVERAGE POUNDS PER DAY (7)	SAMPLE TYPE (8)	SAMPLE FREQUENCY (9)	METHOD OF ANALYSIS (10)	CONTINUOUS MONITORING (D) (11)
ACIDITY (as $CaCO_3$) 00435	10	10	9	0.45	32.4	6	17.4	A	O	S	A
TOTAL ORGANIC CARBON (T.O.C.) 00680	6.0	29	26.5	1.35	95.4	19.7	57.0	A	O	S	A
TOTAL HARDNESS 00900	85.9	118.66	130.2	6.60	468.7	80.9	235.19	A	O	S	A
NITRITE (as N) 00615	<0.001	0.005	0.011	$\times 10^{-2}$ 0.005	0.0396	0.0057	0.0164	A	O	S	A
ORGANIC NITROGEN 00605	W 0.65										
PHOSPHORUS-ORTHO (as P) 70507	0.065	0.033	0.200	0.010	0.72	0.11	0.319	A	O	S	A
SULFATE 00945	4.3	5.2	470	23.8	1691.32	449.33	1302.54	A	O	S	A
SULFIDE 00745	0.012	0.014	0.0160	0.001	0.0576	0.0147	0.0425	A	O	S	A
SULFITE 00740	W <(0.1)										
BROMIDE 71870	W 0.44										

000425

SCM

PART B

(Office use only) 000205

Discharge Serial No. 000205 - 001

B-2. (cont.) **CHEMICAL PARAMETERS OF INTAKE WATER AND DISCHARGE (See Table B-2)**

Intake		Discharge									
PARAMETER AND CODE	(1) UNTREATED INTAKE WATER	(2) TREATED INTAKE WATER	(3) MAXIMUM CONCENTRATION	(4) MAXIMUM POUNDS PER DAY PER PROCESS UNIT	(5) MAXIMUM POUNDS PER DAY	(6) DAILY AVG. CONCENTRATION	(7) AVERAGE POUNDS PER DAY	(8) SAMPLE TYPE	(9) SAMPLE FREQUENCY	(10) METHOD OF ANALYSIS (D)	(11) CONTINUOUS MONITORING
CHLORIDE 00940	21	20	1,760	89.2	633347	145333	421298	A	O	S	A
CYANIDE 00720	0.063	0.0111	0.430	0.022	1.5474	0.2420	0.7015	A	O	S	A
FLUORIDE 00951	0.15	1.4	0.520	0.026	1.8713	0.2910	0.8436	A	O	S	A
ALUMINUM-TOTAL 01105	0.06 (ppm)	0.06 (ppm)	5.60 (ppm)	0.284	20.1520	2.667 (ppm)	7.7302	A	O	ES (F)	A
ANTIMONY-TOTAL 01097	<0.05 (ppm)	< 0.01 (ppm)	<0.100 (ppm)	<0.005	<.3599	< .1000 (ppm)	<0.2899	A	O	ES	A
ARSENIC-TOTAL 01002	< 0.1 (ppm)	< 0.10 (ppm)	< 0.10 (ppm)	<0.005	< .3599	<.1000 (ppm)	<.2899	A	O	ES	A
BARIUM-TOTAL 01007	W <0.01 (ppm)										
BERYLLIUM-TOTAL 01012	W <0.01 (ppm)										
BORON-TOTAL 01022	W 0.04 (ppm)										
CADMIUM-TOTAL 01027	< 0.05 (ppm)	< 0.05 (ppm)	< .050 (ppm)	<0.002	<.1799	< .0500 (ppm)	<.1449	A	O	ES	

PART B

(Office use only) 000205

Discharge Serial No. 000205 - 001

B-2. (cont.) CHEMICAL PARAMETERS OF INTAKE WATER AND DISCHARGE (See Table B-2)

	Intake	Discharge									
PARAMETER AND CODE	UNTREATED INTAKE WATER (1)	TREATED INTAKE WATER (2)	MAXIMUM CONCENTRATION (3)	MAXIMUM POUNDS PER DAY PER PROCESS UNIT (4)	MAXIMUM POUNDS PER DAY (5)	DAILY AVG. CONCENTRATION (6)	AVERAGE POUNDS PER DAY (7)	SAMPLE TYPE (D) (8)	SAMPLE FREQUENCY (9)	METHOD OF ANALYSIS (10)	CONTINUOUS MONITORING (11)
CALCIUM-TOTAL 00916	35	35	16	0.811	57.577	13.667	39.6175	A	O	ES	A
CHROMIUM-TOTAL 01034	< 0.01 (ppm)	< 0.01 (ppm)	0.10 (ppm)	0.005	0.3599	0.0400 (ppm)	0.1160	A	O	ES	A
COBALT-TOTAL 01037	W < 0.01 (ppm)										
COPPER-TOTAL 01042	0.01 (ppm)	< 0.01 (ppm)	0.300 (ppm)	0.015	1.0796	0.1733 (ppm)	0.5025	A	O	ES	A
IRON-TOTAL 01045	0.1 (ppm)	0.06 (ppm)	3.0 (ppm)	0.152	10.7957	1.5667 (ppm)	4.5415	A	O	ES	A
LEAD-TOTAL 01051	< 0.01 (ppm)	< 0.01 (ppm)	< 0.01 (ppm)	$\times 10^{-3}$ <0.5	<0.0360	<0.0100 (ppm)	<0.0290	A	O	ES	A
MAGNESIUM-TOTAL 00927	3.0	7.6	22	1.11	79.1684	11.3333	32.8535	A	O	ES	A
MANGANESE-TOTAL 01055	< 0.01 (ppm)	< 0.01 (ppm)	0.3000 (ppm)	0.015	1.0796	0.2200 (ppm)	0.6377	A	O	ES	A
MERCURY-TOTAL 71900	(W) <0.5 ppb	< 0.5 (ppb)	< 0.5 (ppb)			< 0.5 (ppb)		A	O	AA (F)	A
MOLYBDENUM-TOTAL 01062	W < 0.01 (ppm)										

SCM

PART B

(Office use only) 000205

Discharge Serial No. 000205 - 001

B-2. (cont.) CHEMICAL PARAMETERS OF INTAKE WATER AND DISCHARGE (See Table B-2)

	Intake	Discharge									
PARAMETER AND CODE	(1) UNTREATED INTAKE WATER	(2) TREATED INTAKE WATER	(3) MAXIMUM CONCENTRATION	(4) MAXIMUM POUNDS PER DAY PER PROCESS UNIT	(5) MAXIMUM POUNDS PER DAY	(6) DAILY AVG. CONCENTRATION	(7) AVERAGE POUNDS PER DAY	(8) SAMPLE TYPE	(9) SAMPLE FREQUENCY	(10) METHOD OF ANALYSIS (D)	(11) CONTINUOUS MONITORING
NICKEL-TOTAL 01067	W 0.02 (ppm)										
POTASSIUM-TOTAL 00937	1.0	0.8	14	0.710	50.3799	7.0	20.2919	A	O	AA	A
SELENIUM-TOTAL 01147	W 0.04 (ppm)										
SILVER-TOTAL 01077	W < 0.01 (ppm)										
SODIUM-TOTAL 00929	1.0	4	1960	99.3	7053.1833	1363.33	3952.0852	A	O	AA	A
THALLIUM-TOTAL 01059	W < 0.1 (ppm)										
TIN-TOTAL 01102	W < 0.01 (ppm)										
TITANIUM-TOTAL 01152	< 0.01 (ppm)	< 0.01 (ppm)	< 0.01 (ppm)	$\times 10^{-3}$ 0.5	< 0.0360	< 0.0100 (ppm)	< 0.0290	A	O	ES	A
ZINC-TOTAL 01092	< 0.01 (ppm)	< 0.01 (ppm)	0.3 (ppm)	0.015	1.0796	0.1067 (ppm)	0.3092	A	O	ES	A
OIL AND GREASE 00550	A	A	A								

ENG FORM 4345-1 JUN 71

SCM 000408

UNITED STATES OF AMERICA
ENVIRONMENTAL PROTECTION AGENCY
REGION V
1 North Wacker Drive
Chicago, Illinois 60606

RECEIVED
AUG 30 1972
THE SHERWIN-WILLIAMS CO.
G. F. WYMAN

AUG 24 1972

Mr. G. F. Wyman, Plant Manager
Sherwin-Williams Chemicals Division
P. O. Box 310
Ashtabula, Ohio 44004

Re: Section 13 Refuse Act
Permit Application
No. OH 070 0X2 2 000205

Dear Mr. Wyman:

It is our understanding based upon an August 14 conversation with the U. S. Army Engineer District, Buffalo, that your Ashtabula manufacturing facility has reduced the number of its outfalls from four (4) to one (1).

The Corps added that in its discussion with your company, it was agreed that you would submit an amended application for this single discharge.

On the basis of the above information, on August 24, 1972, we withdrew our request for the Ohio Department of Health to certify the referenced application for four (4) outfalls.

As you prepare your amended application, please incorporate the type of additional or clarifying information which we requested on your original application. Upon completion, please forward the amended copy to the U. S. Army Engineer District, Buffalo, with a copy to this office so that we may commence its preliminary processing without delay. We will expect to receive official Corps of Engineers endorsed copies later.

Your cooperation in this matter will be appreciated.

Very truly yours,

for A. H. Manzardo
Chief, Refuse Act
Permit Program Branch

SCM SCM

cc:
U.S. Army Engineer Dist., Buffalo
G. F. Schlaudecker, Group Vice-Pres.
cc: FCG, CGB, HLB

000393

PART B

(Office use only) 000205

Discharge Serial No. 000205 - 001

B-2. (cont.) CHEMICAL PARAMETERS OF INTAKE WATER AND DISCHARGE (See Table B-2)

	Intake	Discharge									
PARAMETER AND CODE	(1) UNTREATED INTAKE WATER	(2) TREATED INTAKE WATER	(3) MAXIMUM CONCENTRATION	(4) MAXIMUM POUNDS PER DAY PER PROCESS UNIT	(5) MAXIMUM POUNDS PER DAY	(6) DAILY AVG. CONCENTRATION	(7) AVERAGE POUNDS PER DAY	(8) SAMPLE TYPE	(9) SAMPLE FREQUENCY	(10) METHOD OF ANALYSIS (D)	(11) CONTINUOUS MONITORING
PHENOLS 32730	(*) ND	ND	ND			(ND)					
SURFACTANTS 38260	W 0.014	ND	ND			(ND)					
ALGICIDES* 74051	ND	ND	ND			(ND)					
CHLORINATED HYDROCARBONS* (EXCEPT PESTICIDES) 74052	ND	ND	ND			(ND)					
PESTICIDES* 74053	ND	ND	ND			(ND)					

*Name specific compound(s) and fill in the required data for each. Use extra blanks at the end of the form and the "Remarks" space as necessary.

* ND = Not Detectable.

SCM

000409

FILE

September 8, 1972

Mr. Gordon A. Tesner, Chief
Construction-Operations Division
Buffalo District, Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

Reference: NCBCO-S
Permit Application No. 000205

Dear Sir:

Our original permit application (000205) which you returned under cover of your letter dated 19 July 1972, is enclosed.

Amendments and corrections previously submitted have been entered on the original in accordance with telephone advice from your office, and are shown in red.

A statement from Mr. G. F. Schlaudecker, Vice-President, Chemicals Group, of The Sherwin-Williams Company is enclosed confirming that to the best of his knowledge the amendments (shown in red) are true, correct, and accurate.

As a result of terminating operation of a part of the Ashtabula facilities and modification of the waste treatment facilities, effluents covered by our application, Serial Nos. 002 and 003 have been eliminated. Accordingly, our application is to be amended by deletion of the sections covered by Serial Nos. 002 and 003.

The originals of Serial Nos. 002 and 003 are, nevertheless, returned herewith in accordance with telephone advice from your office.

As a consequence of these changes our application now represents one discharge only, as covered by Serial No. 001.

SCM

SCM

000207

Mr. Gordon A. Tanner, Chief
Construction-Operations Div.
Corps of Engineers

Ref: RCRC9-6
Permit Application
No. 000203

In accordance with the request of Mr. A. E. Manzardo, U.S.A. Environmental Protection Agency, in his letter of August 24, 1972, a copy of the amended application is being sent to the Environmental Protection Agency Office, Chicago, Illinois.

Very truly yours,

SHERWIN-WILLIAMS CHEMICALS

G. F. Wyman
Plant Manager

GFW/ca

cc: FCG CGB HLB GFS
A. E. Manzardo, EPA, Chicago

Enclosures

SCM

000203

1 North Wacker Drive
Chicago, Illinois 60606

Mr. James G. Haywood, Engineer Secretary
Ohio Water Pollution Control Board
Ohio Department of Health
Columbus, Ohio 43216

Re: Section 13 Refuse Act
Permit Application
No. OH 070 0X2 2 000205
(Sherwin-Williams Co.)

Dear Mr. Haywood:

On March 14, we determined the above-referenced application for four (4) outfalls to be administratively complete and forwarded it to your office.

We have recently been informed by the U. S. Army Engineer District, Buffalo, that the applicant has completed a significant modification of its facilities. Its four (4) outfalls have now been reduced to one (1), thereby, invalidating the original permit application dated June 30, 1972.

The company has indicated that it intends to submit an amended application which will describe current conditions. Our request for State certification of the original forwarded application is therefore withdrawn.

Very truly yours,

SCM

A. H. Mansardo
Chief, Refuse Act
Permit Program Branch

cc:
A. Wesner, Ohio Department of Health
Sherwin-Williams co.
U.S. Army Eng. Dist., Buffalo
H. Anderson, BSF&W, Minneapolis
W. West, Dir., Ohio Dist. Office (Blind)

CC: FCG, CGB, HLB

Norman Johnson
Richard Harpster
Edward Valentine

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

IN REPLY REFER TO NCBCO-S

19 July 1972

G. F. Wyman, Plant Manager
Sherwin-Williams Chemicals Division
P.O. Box 310
Ashtabula, OH 44004

RECEIVED
JUL 24 1972
THE SHERWIN-WILLIAMS CO.
G. F. WYMAN

Dear Mr. Wyman:

This letter is to acknowledge receipt of your permit application for an industrial discharge from your facility located at:
Ashtabula, Plant
Ashtabula, OH. 44004

Your application is returned as it has not been properly completed. Please amend your application in accordance with the instructions contained on the attached sheets. All items must be answered. If the item does not apply, indicate N/A.

Please refer to the instruction pamphlet entitled, "Permits for Work and Structures in, and for Discharges or Deposits into Navigable Waters" for guidance in completing your application. If after reviewing this pamphlet you have any questions, please contact our office. Our telephone number is (716) 876-5454, Ext. 31 or 86. Each change (addition or revision) to your original application must be initialed by the certifying official that signed the original application.

Please resubmit the completed application to our office within 30 days from date of this letter. Failure to supply the required information within the allotted time will leave our office no alternative but to take legal action. Your application has been assigned Application Number 0 0 0 2 0 5. Use this number in all further correspondence concerning the application.

Sincerely yours,

SCM

Incl
as

GORDON A. YESSER, Chief
Construction-Operations Division

000401

22. **PHYSICAL DESCRIPTION OF INTAKE WATER AND DISCHARGE** 000205

Intake / Discharge | (Office use only)

Discharge Serial No. 001

Parameter and (Code)	UNTREATED INTAKE WATER (1)	TREATED INTAKE WATER (2)	AVERAGE (DAILY) (3)	MINIMUM (OPERATING YEAR) (4)	MAXIMUM (OPERATING YEAR) (5)	SAMPLE FREQUENCY (6)	CONTINUOUS MONITORING (7)
Flow (Gallons per day) 00056	(4) Addendum 1,297,000	745,000	348,000	239,000	432,000	OTHR	REC
pH 00400	8.0	10.5	7.5	6.5	9.8	OTHR	REC
Temperature (Winter) (°F) 74028	46°	46°	74°	59°	94°	DYLY	ABS
Temperature (Summer) (°F) 74027	75°	75°	89°	Est. 75°	Est. 109°	OTHR	ABS

23. **DISCHARGE CONTENTS**

PARAMETER	PRESENT	ABSENT	PARAMETER	PRESENT	ABSENT	PARAMETER	PRESENT	ABSENT
Color 00080	(X)		Aluminum 01105	X		Nickel 01067	?	
Turbidity 00070	X		Antimony 01097	?		Selenium 01147	?	
Radioactivity 74050	?		Arsenic 01002	?		Silver 01077	?	
Hardness 00900	X		Beryllium 01012	?		Potassium 00937	X	
Solids 00500	X		Barium 01007	?		Sodium 00929	X	
Ammonia 00610	X		Boron 01022	?		Titanium 01152	X	
Organic Nitrogen 00605	X		Cadmium 01027	?		Tin 01102	?	
Nitrate 00620	X		Calcium 00916	X		Zinc 01092	?	
Nitrite 00615	?		Cobalt 01037	?		Algicides 74051		X
Phosphorus 00665	X		Chromium 01034	?		Oil and Grease 00550		X
Sulfate 00945	X		Copper 01042	?		Phenols 32730		X
Sulfide 00745	?		Iron 01045	?		Surfactants 38260	?	
Sulfite 00740	?		Lead 01051	?		Chlorinated Hydrocarbons 74052	?	
Bromide 71870	?		Magnesium 00927	?		Pesticides 74053		X
Chloride 00940	X		Manganese 01055	?		Fecal Streptococci Bacteria 74054	?	
Cyanide 00720	?		Mercury 71900	?		Coliform Bacteria 74056	?	
Fluoride 00951	?		Molybdenum 01062	?				

PART B

(Office use only) 000205

See Addendum (C)

Discharge Serial No. 000205-001

B-3. RADIOACTIVE PARAMETERS OF INTAKE WATER AND DISCHARGE (See Table B-3)

	Intake	Discharge						
PARAMETER AND CODE	UNTREATED INTAKE WATER	TREATED INTAKE WATER (1)	AVERAGE (DAILY) (2)	MINIMUM (OPERATING YEAR) (1)	MAXIMUM (OPERATING YEAR)	SAMPLE FREQUENCY	CONTINUOUS MONITORING	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
ALPHA-TOTAL 01501	0.36	0.78	6.6	X	10.0	0	A	
ALPHA COUNTING ERROR 01502	0.40	0.59	4.5	X	13.5	0	A	
BETA-TOTAL 03501	5.56	4.14	7.26	X	10.7	0	A	
BETA COUNTING ERROR 03502	0.13	0.62	6.73	X	10.5	0	A	
GAMMA-TOTAL 05501	7.8	45.2	7.8	X	7.8	0	A	
GAMMA COUNTING ERROR 05502	0	4.90	-	X	-	0	A	
TRITIUM-TOTAL 07000 (3)	-	-	-	X	-	-	-	
TRITIUM COUNTING ERROR 07001	-	-	-	X	-	-	-	

B-4. REMARKS

(1) Spot Samples - Analyses for three days were averaged for average concentration, high analyses for three days was high.

(2) One spot sample analyzed, no averages considered.

(3) Does not apply to operations.

000410

SCM

3 August 197

22. **PHYSICAL DESCRIPTION OF INTAKE WATER AND DISCHARGE**

Intake # (10) Addendum Discharge

(Office use only) 000205

Discharge Serial No. 002 - Supplemer July 29, 19

Parameter and (Code)	UNTREATED INTAKE WATER (1)	TREATED INTAKE WATER	AVERAGE (DAILY) (2)	MINIMUM (OPERATING YEAR) (3)	MAXIMUM (OPERATING YEAR) (4)	SAMPLE FREQUENCY (5)	CONTINUOUS MONITORING (6)	(7)
Flow (Gallons per day) (00056)	(11) Addendum 217,980		59,330	141,000	0	220,554	DYLY	ABS
pH 00400	8.0		7.5	7.1	6.9	9.0	DYLY	MON
Temperature (Winter) (°F) 74028	46°		46°	59°	46°	75°	DYLY	MON
Temperature (Summer) (°F) 74027	75°		75°	Est. 74°	Est. 75°	Est. 85°	DYLY	MON

DISCHARGE CONTENTS

PARAMETER	PRESENT	ABSENT	PARAMETER	PRESENT	ABSENT	PARAMETER	PRESENT	ABSENT
Color 00080	(X)		Aluminum 01105	X		Nickel 01067	?	
Turbidity 00070	X		Antimony 01097	?		Selenium 01147	?	
Radioactivity 74050	?		Arsenic 01002	?		Silver 01077	?	
Hardness 00900	X		Beryllium 01012	?		Potassium 00937	X	
Solids 00500	X		Barium 01007	?		Sodium 00929	X	
Ammonia 00610	X		Boron 01022	?		Titanium 01152	?	
Organic Nitrogen 00605	X		Cadmium 01027	?		Tin 01102	X	
Nitrate 00620	X		Calcium 00916	X		Zinc 01092	?	
Nitrite 00615	?		Cobalt 01037	?		Algicides 74051		X
Phosphorus 00665	X		Chromium 01034	?		Oil and Grease 00550		X
Sulfate 00945	X		Copper 01042	?		Phenols 32730		X
Sulfide 00745	X		Iron 01045	X		Surfactants 38260		X
Sulfite 00740	?		Lead 01051	?		Chlorinated Hydrocarbons 74052		X
Bromide 71870	?		Magnesium 00927	?		Pesticides 74053		X
Chloride 00940	X		Manganese 01055	?		Fecal Streptococci Bacteria 74054	?	
Cyanide 00720	?		Mercury 71900	?		Coliform Bacteria 74056	?	
Fluoride 00951	?		Molybdenum 01062	?				

SCM

000411

ENG FORM 4345 4

record:

(a) Deed from Theodore E. Warren, with dower release, to Defense Plant Corporation, dated October 6, 1942, and recorded in Volume 376, Page 260, of Ashtabula County Records.

(b) Deed from Mrs. Nellie Terry, with dower release, to Defense Plant Corporation, dated November 7, 1942, and recorded in Volume 376, Page 321 of Ashtabula County Records.

(c) Deed from Theodore E. Warren and Ada E. Warren, husband and wife, to Defense Plant Corporation, dated November 10, 1942, and recorded in Volume 370, Page 28 of Ashtabula County Records.

(d) Deed from J. M. Ross, aka John M. Ross and Idabel R. Ross, husband and wife, to Defense Plant Corporation, dated December 5, 1942, and recorded in Volume 376, Page 363 of Ashtabula County Records.

(e) Deed from Robert S. Morrison and Helen S. Morrison, husband and wife, to Defense Plant Corporation, dated December 5, 1942, and recorded in Volume 376, Page 362 of Ashtabula County Records.

(f) Deed from Earl L. Scoville and Lydia Scoville, husband and wife, to Defense Plant Corporation, dated December 5, 1942, and recorded in Volume 376, Page 361 of Ashtabula County Records.

(g) Deed from C. H. Gordon, with dower release, to Defense Plant Corporation, dated December 5, 1942, and recorded in Volume 376, Page 360 of Ashtabula County Records.

(h) Deed from Henrietta A. Carr, a widow, to Defense Plant Corporation, dated December 5, 1942, and recorded in Volume 376, Page 359 of Ashtabula County Records.

(i) Deed from Robert S. Morrison and Helen S. Morrison, husband and wife, to Defense Plant Corporation, dated October 22, 1942 and recorded in Volume 373, Page 41 of Ashtabula County Records.

(j) Deed from United States of America to Reconstruction Finance Corporation, dated November 1, 1944, and recorded in Volume 380, Page 594 of Ashtabula County Records and subsequent deed from Reconstruction Finance Corporation to Defense Plant Corporation dated November 30, 1944, and recorded in Volume 380, Page 628 of Ashtabula County Records.

(k) Vacation proceedings by Board of County Commissioners of Ashtabula County vacating Waldo Drive, Clinton Drive, Bates Drive, and Mina Drive, as appears from Commissioner's Journal, Volume 33, Page 506.

(l) Deed from W. H. Crawford and Jessie H. Crawford, husband and wife, and Clyde C. Conley and Achsa L. Conley, husband and wife, to Defense Plant Corporation, dated November 9, 1942, and recorded in Volume 373, Page 57 of Ashtabula County Records.

(m) Deed from Richard E. Cook and Nellie Cook, husband and wife, to Defense Plant Corporation, dated October 31, 1942, and recorded in Volume 370, Page 19 of Ashtabula County Records.

Said above described premises are conveyed subject to and together with all rights granted by or to Defense Plant Corporation and/or Reconstruction Finance Corporation in or by the following instruments:

(1) Bill of Sale from The Cleveland Electric Illuminating Company to Defense Plant Corporation, dated November 1, 1942, and recorded in Volume 373, Page 621 of Ashtabula County Records;

Ashtabula County Records;

(3) Switch Track Easement from The Cleveland Electric Illuminating Company to Defense Plant Corporation, dated June 28, 1943, and recorded in Volume 373, Page 578 of Ashtabula County Records;

and all right, title and interest of the Grantor herein is hereby assigned to the Grantee, its successors and assigns; and by the acceptance of this Deed the Grantee for itself, and its successors and assigns, assumes all of the obligations and liabilities imposed upon the Grantor herein by the terms of any of said instruments hereinabove referred to.

Together with all and singular the tenements, hereditaments and appurtenances belonging or in any manner appertaining to all of the above described premises conveyed to the Grantee hereby, and together with all right, title and interest of the Grantor in and to all buildings, improvements, structures and betterments located on the above described premises.

Said property was duly declared surplus and was assigned to War Assets Administrator for disposal, acting pursuant to Executive Order 9689 and the provisions of the Surplus Property Act of 1944 and W.A.A. Regulation No. 1, as amended.

TO HAVE AND TO HOLD the foregoing described premises, with all the privileges and appurtenances thereto belonging, to the said Grantee, its successors and assigns, forever.

AND the said Grantee has certified and by the acceptance of this Quitclaim Deed agrees for itself, its successors and assigns, as follows:

First: That the said Grantee is acquiring the said property for its own use;

Second: That the said Grantee is not acquiring the said property for the purpose of reselling or leasing it;

Third: That in no case will the Grantee resell or lease the said property within three (3) years from the date of this instrument without first obtaining the written authorization of the War Assets Administrator, or his successor, if any.

IN WITNESS WHEREOF, the RECONSTRUCTION FINANCE CORPORATION, acting by and through WAR ASSETS ADMINISTRATOR has caused this Deed to be executed this 22nd day of May 1947, effective as of June 19, 1946.

Signed and acknowledged in the presence of:

Sol Elson
Sol Elson

L. E. Nelson
L. E. Nelson

($5,555.00 I. R. Stamps Cancelled)

RECONSTRUCTION FINANCE CORPORATION acting by and through WAR ASSETS ADMINISTRATOR

BY John A. Loomis
John A. Loomis
Director, Legal Division
Office of Real Property Disposal
War Assets Administration

DISTRICT OF COLUMBIA
: SS
CITY OF WASHINGTON

On this, the 22nd day of May, A. D., 1947, before me, Howard D. Denton, a Notary Public in and for said District, personally appeared John A. Loomis, who acknowledged himself to be the Director, Legal Division, Office of Real Property Disposal, War Assets Administration, acting herein on behalf of the Reconstruction Finance Corporation, and that he as such Director, Legal Division, Office of Real Property Disposal, War Assets Administration, being authorized to do so, as set forth in the foregoing instrument, executed the foregoing instrument in the capacity therein stated and for the purposes therein contained by signing the name of the Reconstruction Finance Corporation, acting by and through War Assets Administrator, as the free act and deed of said Corporation and his free act and

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

Howard D. Denton

Howard _ Denton, Notary Public (Seal)
My Commission Expires: July 14, 1951.

Received for Record June 18, 1947, at 9:52 A. M.

Recorded June 19, 1947

UNION CARBIDE NOW ELKEM METALS

SUMMARY OF IMPROVEMENT VALUES (1978)

PARCEL #026880-03-10-12

CONST. DATE	I.D.	PRIMARY USE	STY. HGT.	GROSS FLOOR AREA GROUND	GROSS FLOOR AREA TOTAL	REPLACEMENT COST	TOTAL DEPR.	RCLD
1943	4/5	Store Room	1	25,144	25,144	$ 315,000	65%	$ 110,300
"	6	Drum Shop	1	20,410	20,410	$ 401,400	70%	$ 120,400
"	7	Carbide Stores	1	26,676	30,616	$ 350,000	70%	$ 105,000
"	8	Carbide Cooling	1	19,596	19,596	$ 408,300	70%	$ 122,500
"	9	Carbide Furnace	1	27,784	46,128	$ 854,500	70%	$ 256,400
"	10	Mixing Building	1	7,544	7,544	$ 189,100	70%	$ 56,700
1953	10X	Mixing Building	1	23,660	23,660	$ 588,000	55%	$ 264,600
1943	11	Ferrosilicon Furnace	1	54,965	83,825	$ 1,796,300	70%	$ 538,900
1942	11A	Ferrosilicon Pack	1	48,490	48,490	$ 1,158,900	70%	$ 347,700
1950	11X	Furnace	1	25,147	25,147	$ 647,100	60%	$ 258,800
1943	13	Motor Power Station	1	851	851	$ 23,000	70%	$ 6,900
"	14	Sewer Disp. Plant	1	-	-	$ 94,000	70%	$ 28,200
"	15	Pump House/Lab.	1	2,892	5,544	$ 185,400	70%	$ 55,600
1949	27	Limestone Storage	1	4,336	4,336	$ 104,100	60%	$ 41,600
"	27A	Limestone Sotrage	1	3,408	3,408	$ 50,800	60%	$ 20,300
"	29	Lime Kiln	1	9,990	9,990	$ 185,300	60%	$ 74,100
1950	30	Lime Storage	1	2,230	2,230	$ 65,100	60%	$ 26,000
1948	33	Warehouse	1	4,200	4,200	$ 25,200	70%	$ 7,600
1951	35	Locomotive House	1	12,214	12,214	$ 248,500	55%	$ 111,800
1951	36	Mixing Building	2	19,599	30,279	$ 792,500	55%	$ 356,600
1953	36X	Mixing Building	2	15,477	23,919	$ 536,600	55%	$ 241,500
1952	46	Lift Station	1	1,020	2,040	$ 48,700	55%	$ 21,900
—	47	Pump House	1	460	920	$ 27,600	55%	$ 12,400
—	48	Pump House	1	460	920	$ 27,600	55%	$ 12,400
1953	49	Lift Station	1	850	1,700	$ 44,200	55%	$ 19,900
"	51	Carbide Furnace	1	27,560	27,560	$ 838,800	70%	$ 251,600
"	51A	Conveyor Building	1	15,370	15,370	$ 351,000	70%	$ 105,300
"	51B	Electrode Shed	1	1,575	1,575	$ 27,000	70%	$ 8,100
"	53	Carbide Packing	2	28,846	40,446	$ 741,000	55%	$ 333,500
1952	55	Acetylene Gen.	1	3,468	5,142	$ 111,600	55%	$ 50,200
1953	57	Metal Furnace	1	60,516	93,627	$ 2,051,400	55%	$ 923,100
"	57A	Cleaning	1	52,010	52,010	$ 1,065,400	55%	$ 479,400
—	57B	Car Loading Shed	1	4,884	4,884	$ 50,800	55%	$ 22,900
1953	62	Warehouse	1	4,200	4,200	$ 25,200	65%	$ 8,800
"	63	Warehouse	1	4,200	4,200	$ 25,200	65%	$ 8,800
"	64	Machine Shop	1	30,000	32,760	$ 626,500	55%	$ 281,900
"	65	Service/Locker	2	11,742	35,226	$ 918,200	55%	$ 413,200
1954	66	#2 Scale Office	2	484	1,452	$ 21,800	55%	$ 9,800
1958	98	Maintenance	1	6,000	6,000	$ 62,400	50%	$ 31,200
1963	127	Abandon		-	-	$ NO VALUE		$ -
1972	50	Motor Station	1	855	855	$ 12,000	15%	$ 10,200
1975	57C	Additive Storage	1	4,524	4,524	$ 69,700	10%	$ 62,700
1973	138	Raw Material Unload	1	3,960	5,194	$ 186,300	15%	$ 158,400
"	139	Control Room	1	1,380	1,380	$ 51,700	15%	$ 43,900

SUMMARY OF IMPROVEMENT VALUES

PARCEL #026880-03-10-12

CONST. DATE	I.D.	PRIMARY USE	STY. HGT.	GROSS FLOOR AREA GROUND	GROSS FLOOR AREA TOTAL	REPLACEMENT COST	TOTAL DEPR.	RCLD
1976	145	General Admin.	1	11,777	11,777	$ 354,500	10%	$ 319,100
"	147	Maintenance	1	1,920	1,920	$ 27,900	10%	$ 25,100
YARD.	Y-1	Abandon		-	-	$ NO VALUE		$ -
"	Y-3	Hoist House	1	943	943	$ 5,700	70%	$ 1,700
"	Y-4	Switch House	1	96	96	$ 2,900	70%	$ 900
"	Y-5	Acetylene Metal	1	154	154	$ 4,200	70%	$ 1,300
"	Y-6	Yard Crew	1	459	459	$ 7,300	60%	$ 2,900
"	Y-7	Wench House	1	600	600	$ 4,200	80%	$ 800
"	Y-8	Garage	1	396	396	$ 3,200	80%	$ 600
"	Y-9A	13 Hydrant Houses		-	-	$ SOUND VALUE		1,300
"	Y-10A	2 Hose Cart Sheds		-	-	$ SOUND VALUE		200
"	Y-10B	7 Guard Sheds		-	-	$ SOUND VALUE		700
"	Y-11	Abandon		-	-	$ NO VALUE		-
"	Y-12	Abandon		-	-	$ NO VALUE		-
"	Y-13	Train Shed		-	-	$ 15,100	60%	$ 6,000
"	Y-14	Steam Meter		166	166	$ 2,000	10%	$ 1,800
"	Y-15	#157		64	64	$ 1,900	05%	$ 1,800
"	Y-16	Emer.Vechile Gar.		1,160	1,160	$ 13,900	10%	$ 12,500
		Fencing		-	-	$ 73,800	50%	$ 36,900
		Railroad Siding		-	-	$ 2,880,000	50%	$ 1,440,000
		Paving		-	-	$ 358,600	50%	$ 179,300
		Water Tank #1		-	-	$ 140,000	50%	$ 70,000
		TOTALS		636,712	787,251	$20,298,400		$ 8,524,000

Estimated Overall Functional and Economic Obsolescence.....00%

Estimated True Value.....$ 8,524,000

OhioEPA

Re: Ashtabula County
Acme Scrap Iron

36

CERTIFIED MAIL

19-5246-0/00077

Mr. Sam Simon
Acme Scrap Iron
P.O. Box 218
Ashtabula, Ohio 44004

May 19, 1981

Dear Mr. Simon:

On May 8, 1981, open burning was observed in the Acme Scrap Iron scrap yard. As you know from past occurrences, open burning is a violation of Ohio Administrative Code Section 3745-19-03, "Open Burning in Restricted Areas."

According to your explanation, the oil from a transformer was ignited by a cutting torch. Apparently, the operator had failed to drain the device before cutting it apart.

I recommended that your "standard operating procedures" be improved to prevent these types of fires from occurring. As we agreed, you will submit a written explanation of the incident. In that explanation, please indicate what measures will be taken to prevent any further fires. Please submit the letter by May 26, 1981. Thank you for your cooperation.

Yours truly,

Christine Mikoy Frazier

Christine Mikoy Frazier
Environmental Scientist
Office of Air Pollution Control

CMF:cll

complaint file

State of Ohio Environmental Protection Agency, Box 1049, 361 East Broad Street, Columbus, Ohio 43216 (614) 466-8565
Northeast District Office
Office of Air Pollution
2110 East Aurora Road
Twinsburg, Ohio 44087

July 7, 1976

19-5246-0/00080

37

ACME Scrap
P. O. Box 218
Ashtabula, Ohio 44004

OhioEPA

Attention: Sam Simon

Dear Mr. Simon,

On the morning of June 23, 1976, Don Heuer and I observed an open fire at the back of your facility. This fire resulted in excessive emissions of black smoke for a period exceeding one (1) hour. Only after we first appeared at your office were efforts made to extinguish the fire. This constitutes a violation of regulation EP-12-03-A and Section 3704.05 of the Ohio Revised Code. Further violations may result in legal action.

Upon inspection of the area where the fire had occurred, it was evident that several commercial sized transformers were involved in the fire. These transformers usually contain a chemical oil known as "PCB's", an identified hazardous waste material. The open burning of PCB's and PCB containing oils results in the emission into the atmosphere of high amounts of these PCB's resulting in a serious threat to public health.

If you should ever receive PCB containing wastes in the future, it is imperative that these wastes be disposed of properly. You may contact this office for more detailed information, should the need arise.

Your cooperation in this matter is most appreciated.

Yours truly,

Lynn D. Clemmer

Lynn D. Clemmer, Chief
Technical Service Group

LDC:lpa

cc: Don J, Heuer, Northeast District Office
Dave Woodring, Northeast District Office
George Sheehan, Columbus Central Office - A P C

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: March 1, 1982

Inspection May 21, 1981

SUBJECT: PCB Inspection at Acme Scrap Iron and Metal in Ashtabula, Ohio

#1

FROM: Daniel C. Watson, Physical Scientist Daniel C. Watson
THRU: A.R. Winklhofer, Director, EDO

38

TO: Karl Bremer, Toxic Substances Coordinator, 5AH

May 21, 1981

At the request of Melinda Becker (OEPA-NEDO) the writer conducted a PCB inspection at Acme Scrap Iron and Metal at 2101 State Road in Ashtabula on May 21, 1981. Ohio on May 21, 1981. Ms. Becker's request was prompted by several reports from Ashtabula residents about the subject company burning PCB transformers. The company reportedly burns the transformers in order to recover copper, aluminum, and steel for sale as scrap metal.

At the facility the writer and Ms. Becker talked to Sam Simon, President of Acme Scrap. Mr. Simon stated that he does not now handle nor has he ever handled PCBs. After this interview the writer, along with Mr. Simon, Ms. Becker, and Dennis Lee (OEPA), toured the facility and the following samples were collected:

5/21/81 →

Sample Number	Type	Location (see attached map)
81EW10S01	Soil	Transformer Burn Area
81EW10S02	Soil	Oil Storage Area
81EW10S03	Water and Oil	Sewer Discharge
81EW10S04	Sediment and Oil	Sediment Below Discharge

Sample 81EW10S01 consisted of soil collected in the area where transformers are reportedly burned. There were pieces of burned transformers in this area and the ground was charred. Sample 81EW10S02 consisted of oil soaked soil collected in an oil storage area. The oil in this area is stored in 55 gallon drums and housekeeping is poor. Samples 81EW10S03 and 81EW10S04 were collected at the point where the facility's storm sewer system discharges into Fields Brook. There is an absorbent boom around this area to keep the massive amount of oil being discharged from this pipe from entering the waterway. The water sample collected from this area contained about 1/4 to 1/2 congealled oil.

Laboratory analysis results from these samples were received at EDO on January 29, 1982, and showed the following:

81EW10S01 - 114 ppm PCB Aroclor 1254 (where transformers are burned)

81EW10S02 - < 5 ppm PCB

81EW10S03 - 189 ppm PCB Aroclor 1254 in the oil layer

81EW10S04 - < 5 ppm PCB

These results indicate that there have been PCB items in the burn area. Also, PCB oil is being handled at this facility and is discharged to Fields Brook via the facility's storm sewer system. This facility has no NPDES permit. Inspectors from the Ohio EPA have

TSCA

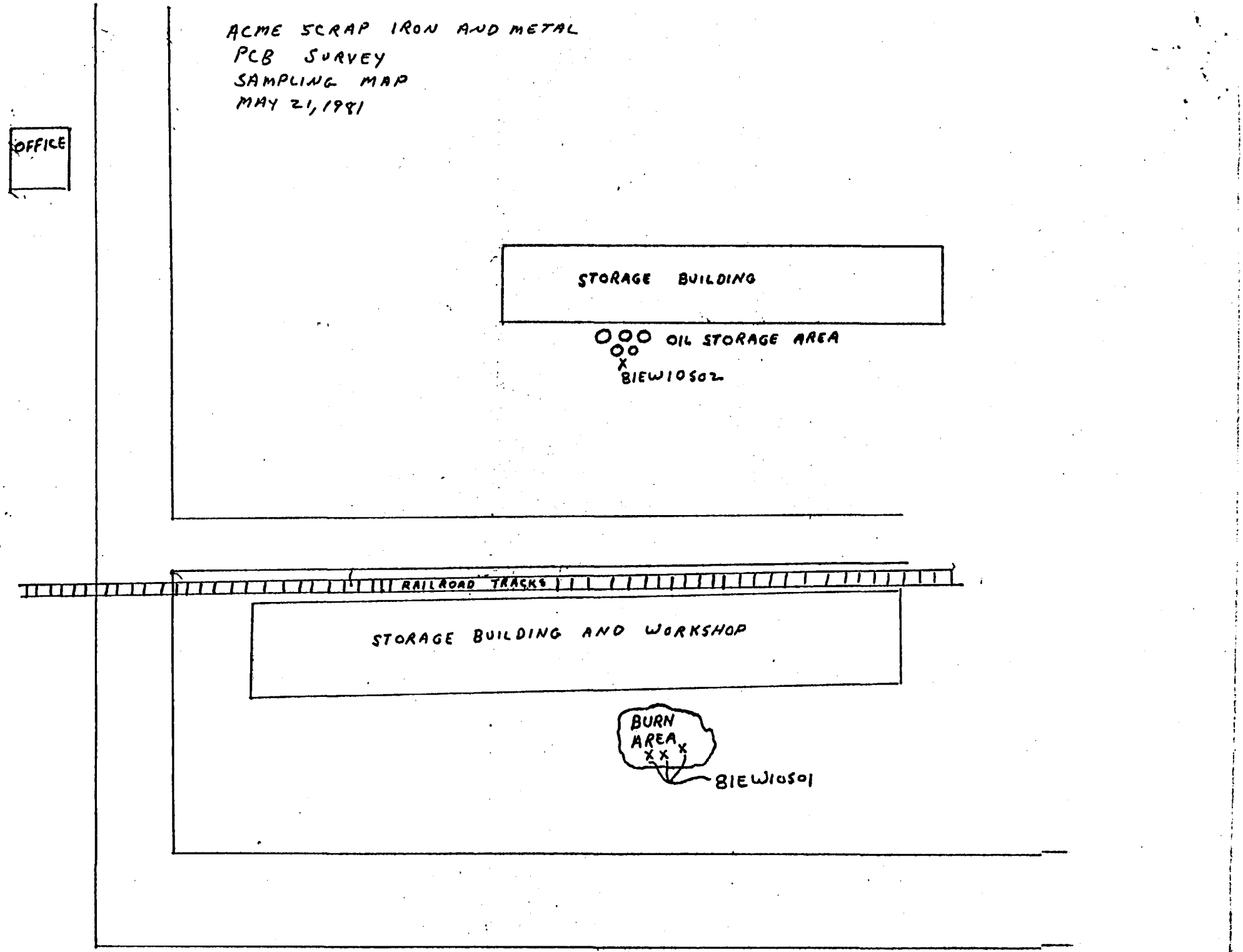
collected samples of this discharge on a bimonthly basis and according to Mark Torf (OEPA) have found concentrations ranging from 100-500 ppm.

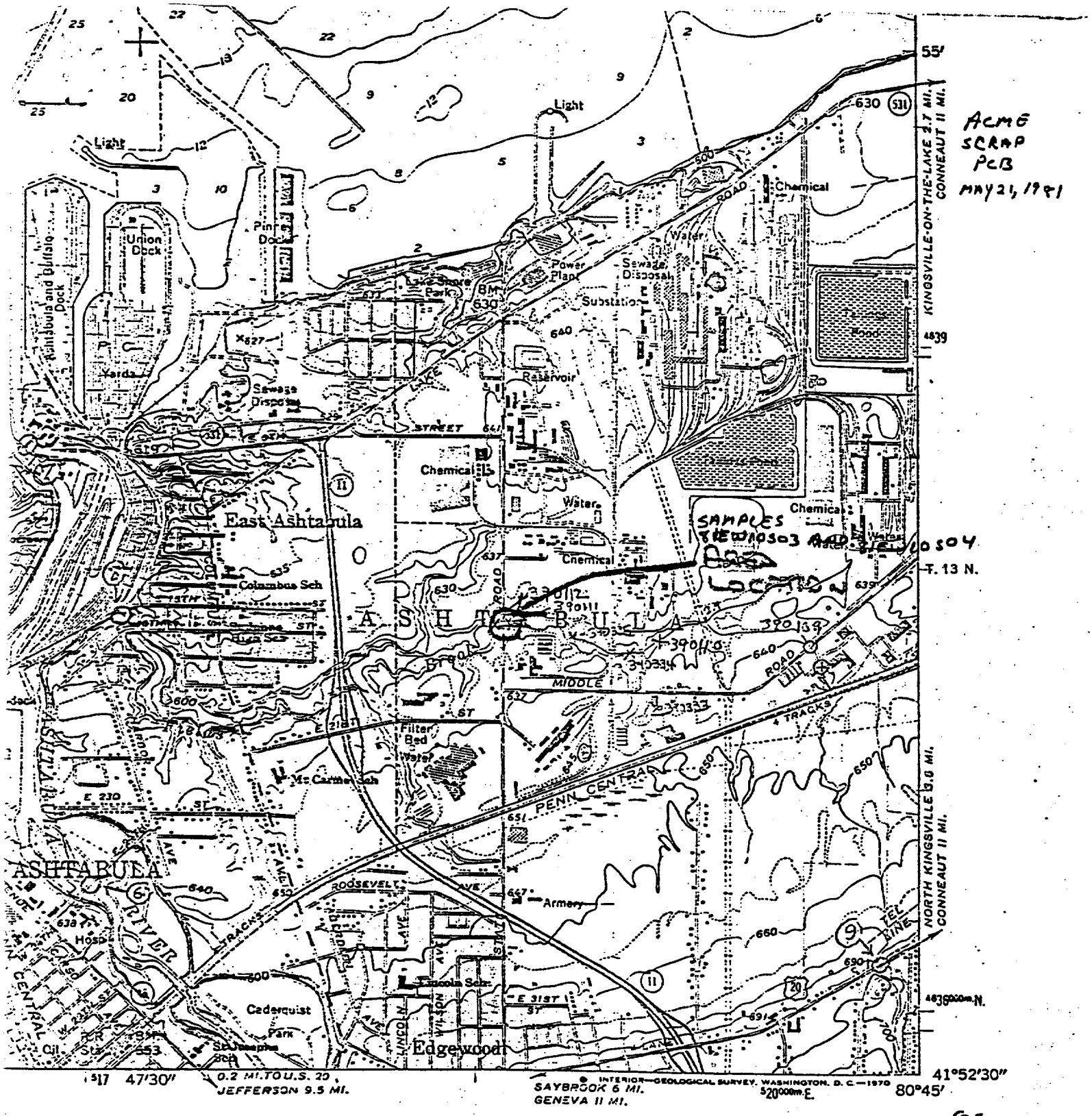
Three large utility transformers were at the facility during this inspection. Mr. Simon of Acme Scrap stated that they came from the Cleveland Electric Illuminating Company's Miles Service Center and are waiting to be scrapped. Mr. Simon stated that he had no documentation showing that these are not PCB transformers but "he knows that CEI would not send him PCB transformers". The writer copied the make and serial numbers off the transformer name plates. This information was given to Dan Rice of CEI on May 22, 1981 and Mr. Rice said he would see if the company had PCB test results for these transformers. Mr. Rice has not as yet done this.

An intensive survey of Acme Scrap has been scheduled for the week of March 29, 1982 to determine the source of the facility's continuous PCB discharge to Fields Brook and the extent of the facility's PCB contamination. Oil samples will also be collected at all storage areas and from any transformers on the property.

cc: Ed DiDominico, 5WQ-13

ACME SCRAP IRON AND METAL
PCB SURVEY
SAMPLING MAP
MAY 21, 1981





1 MILE

7000 FEET

KILOMETER

ROAD CLASSIFICATION

Medium-duty _____ Light-duty _____

Unimproved dirt - - - - - -

U. S. Route ◯ State Route

Heavy-duty _____

OHIO

QUADRANGLE LOCATION

ASHTABULA NORTH, OHIO

NE/4 ASHTABULA 15' QUADRANGLE

N4152.5—W8045/7.5

1960

PHOTOREVISED 1970

AMS 4867 IV NE—SERIES V852

Revisions shown in purple compiled in cooperation with State of Ohio agencies from aerial photographs taken 1970. This information not field checked

20242

ON REQUEST

Hatfield - Per your request

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

SUBJECT: Compliance Monitoring Field Report

DATE: Sept. 15, 1975

FROM: A. R. Winklhofer Charles J. Elly for
Director, MODO

TO: J. O. McDonald, Director, Enf. Div.
Attn: Compliance Section

39

THRU: Chris Timm, Director, S&A Div.

This compliance monitoring field report was requested by the Enforcement Division and was prepared by Michael Bennett. Please direct all questions directly to Mr. Bennett.

Discharger: Detrex Chemical Industries, Inc.
Muriatic Acid Plant
P. O. Box 248
Ashtabula, Ohio 44004

NPDES Permit No: OH 0001872

Responsible Official: Arnold Freede, Plant Supervisor

Survey Dates:

Inspection: July 30, 1975
Sampling: August 8, 1975

In summary, the assessment of compliance with the above-mentioned permit showed:

1. The permittee was in compliance with applicable maximum daily effluent limitations on the sampling date (Table 1). However, the plant operating conditions may have affected the survey results since only the pyrrole unit was operating during sampling. The muriatic acid unit was down.

2. At Outfall 002 relatively high concentrations of organic compounds, which are not limited by the permit, were detected. The compounds detected were: trichloroethylene (16 mg/l), tetrachloroethylene (5.8 mg/l), 1,1,2,2 tetrachloroethane (12 mg/l), ethylamine (present in an unknown concentration), and two unidentified others with a combined concentration of 23.3 mg/l. High concentrations of oil and grease (12 mg/l), which is most likely comprised of the above-mentioned organic materials, were also detected. These organic compounds represent a potential threat to the receiving stream because of their toxic characteristics. Therefore, in order to insure the protection of the receiving stream it is recommended that the Ohio EPA modify the NPDES permit to include weekly monitoring for the above contaminants. In addition, a compliance schedule for corrective action should be included.

Water Division

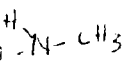
EPA Form 1320-6 (Rev. 6-72)

3. The company stated that self-monitoring and reporting of analytical results for permit constituents follows the requirements of its NPDES permit. According to the company's report, samples are analyzed pursuant to Section 304(g) of the FWPCA. Some additional monitoring has been done by the company and reported as required. One exception to the above statements is that the flow at Outfall 002 is not measured continuously as required by the permit. Presently flows are visually estimated for reporting.

4. Detrex has several abandoned lagoons which were previously used for retention of wastewater from the chlorinated hydrocarbon process. However, presently they have a low liquid level and receive only surface runoff. The lagoons probably still contain a large amount of chlorinated hydrocarbons and other organic waste materials, which presents a potentially dangerous situation since the lagoons are not being maintained and erosion may eventually allow the wastes to escape.

The State Road plant of Detrex Chemical Industries is involved in the manufacture of muriatic acid (HCl) and N-methylpyrrole. However, due to the current market muriatic acid was only produced for four days in June, not at all in July, and only an expected two days in August. Operation of the pyrrole unit is more consistent but at the time of the inspection it was down for maintenance. Normal operations are expected to resume sometime in August. Presently the company employs 9 persons and operates four shifts per day, two men per shift, with one relief man. Formerly this plant produced chlorinated solvents but these operations were terminated in April, 1972. Figure 1 is a sketch of the plant site.

Muriatic acid is the plant's main product. The manufacturing process involves reacting hydrogen and chlorine gases to form hydrogen chloride gas. The gas is then contacted with water in a falling film absorber to form the aqueous acid. The acid is primarily used as pickling liquor by the steel industry.



N-methylpyrrole is manufactured from furan and monomethylamine in a catalytic reactor. After the reaction is complete the pyrrole compound is distilled from the reactant. About 250 gallons of the chemical are produced per week for use mainly as a stabilizer and antioxidant in industrial solvents.

The two processes result in a combined discharge of 100,000 to 110,000 gallons per day of noncontact cooling water, and some process waters, at Outfall 001. The acid unit accounts for 85 to 90 percent of the effluent while the remainder is attributed to the pyrrole unit. The cooling water reportedly contains no pretreatment additives or corrosion inhibitors. Before discharge the process wastewaters, consisting of condensed steam containing HCl, are treated in a control tank with a dilute caustic solution to neutralize the acid pH. HCl fumes forming in acid storage tanks are also sent to the neutralization tank. The tank contains two pH probes which automatically activate the required flow of caustic to achieve neutralization. Cooling

water is directed to the tank as needed to maintain a sufficient volume for pH stabilization of the process wastewaters. After neutralization the process wastewaters are combined with the cooling water and discharged directly to Fields Brook. Prior to the installation of the neutralization process the effluent was passed through a series of ponds before discharge. The ponds are no longer used.

Honeywell Inc. is presently under contract with Detrex to maintain the company's pollution control system. The contractor is required to provide regular inspection and maintenance of pollution control equipment, as well as respond to any related emergency.

Another outfall (002) exists at the plant but the company stated it has not been used since the chlorinated solvents operation was shut down. The outfall is a 24-inch sewer feeding a 48-inch sewer to Fields Brook. Flow in the 24 inch sewer is very low (1-2 gpm), composed only of surface runoff and groundwater drainage, according to the company. However, chlorinated solvents are present at the outfall because of ground saturation from past discharges.

A compliance monitoring survey of the Muriatic Acid Plant was conducted on August 7, 1975. Grab samples for suspended and dissolved solids, aluminum, iron, magnesium, mercury, oil and grease, residual chlorine, pH, and temperature were collected at the plant intake and Outfall 001. Samples for oil and grease and chlorinated hydrocarbons were collected at Outfall 002. At the time of sampling weather conditions were clear and warm. Flows were measured at the outfalls using a bucket and stopwatch, and at the intake with the company's meter. Comparative samples were not collected by the company or split with them. Standard U. S. EPA, Region 5 custody procedures were employed throughout the survey. The Ohio EPA participated in the inspection of this facility but not the sampling program.

With respect to self-monitoring, the company stated that all samples for permit constituents are analyzed at the plant laboratory, with the exception of metals which are analyzed by Envirolab Inc. of Painesville. Metals analyses were performed by Cosma Laboratories of Cleveland until about three months ago when the company changed contractors. Detrex also makes the required flow and temperature measurements at Outfall 001. Continuous flow measurements are based upon incoming water metering. Although Outfall 002 is not used by the company flow measurements are still required. However, at the time of the inspection a flow measuring device had not been installed. The company reportedly had hired a private contractor to install a device but the actual installation was not possible due to an improper fitting. The company stated it is developing a new plan for measuring flow at the outfall. Presently the flows are visually estimated for reporting.

Enclosure
cc: D. Seeds, OEPA, NEDO
J. Evans, OEPA, Columbus

File

OhioEPA
State Of Ohio Environmental Protection Agency

Northeast District Office
2110 E. Aurora Road; Twinsburg, Ohio 44087-1969

(216) 425-9171

Richard F. Celeste, Governor

CERTIFIED MAIL

40

August 14, 1986

Re: Detrex Chemical Industries, Inc.
3IF00017*ED
Compliance Sampling Inspection

Mr. Robert Jones
Vice President
Detrex Chemical Industries, Inc.
North State Road
P.O. Box 623
Ashtabula, Ohio 44004

Dear Mr. Jones:

On July 9, 1986, Mr. Steven W. Love conducted a compliance sampling inspection at Detrex Chemical Industries, Ashtabula. The results of that inspection are enclosed. You will note that Detrex is considered in significant noncompliance with its NPDES permit conditions. The following are the major violations noted during the evaluation:

1. Unauthorized point source discharge pipe located on the northern boundary of your property is discharging into the D. S. Tributary of Fields Brook.

2. Chronic violations of pH and Total Suspended Solids limitations at outfall 002.

3. Inadequate or nonexistent flow monitoring devices.

4. Discharge of unauthorized pollutants into waters of the state. Samples at outfall 002 and storm drains tributary to outfall 002 identified the presence of vinyl chloride, 1,1,-dichloroethene, trans-1,2-dichloroethene, trichloroethene, 1,1,2-trichloroethane, tetrachloroethene, methylene chloride, 1,1,2,2 tetrachloroethane, toluene, chlorobenzene, 1,2-dichlorobenzene, carbon tetrachloride and 1,1,1 trichloroethane.

5. Quality control procedures such as duplicate or spiked samples are not used in the laboratory. Samples are not refrigerated during compositing.

Detrex is currently in significant noncompliance with its permit conditions. Inform this office in writing within ten (10) days of receipt of this letter what immediate steps your company will take to bring the facility into compliance.

Yours truly,

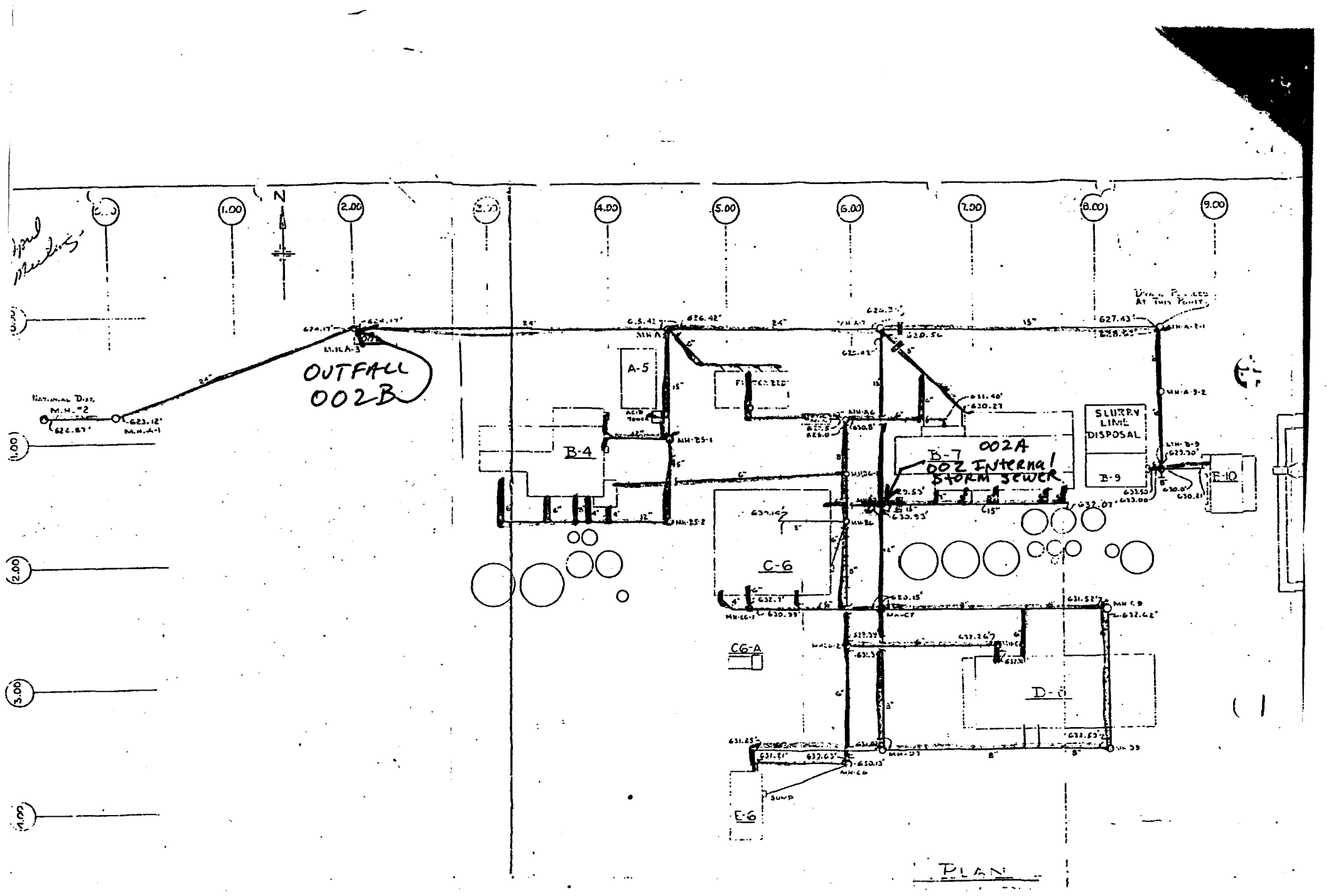
Dennis E Lee

Dennis E. Lee, P.E.
Group Leader
Industrial Wastewater

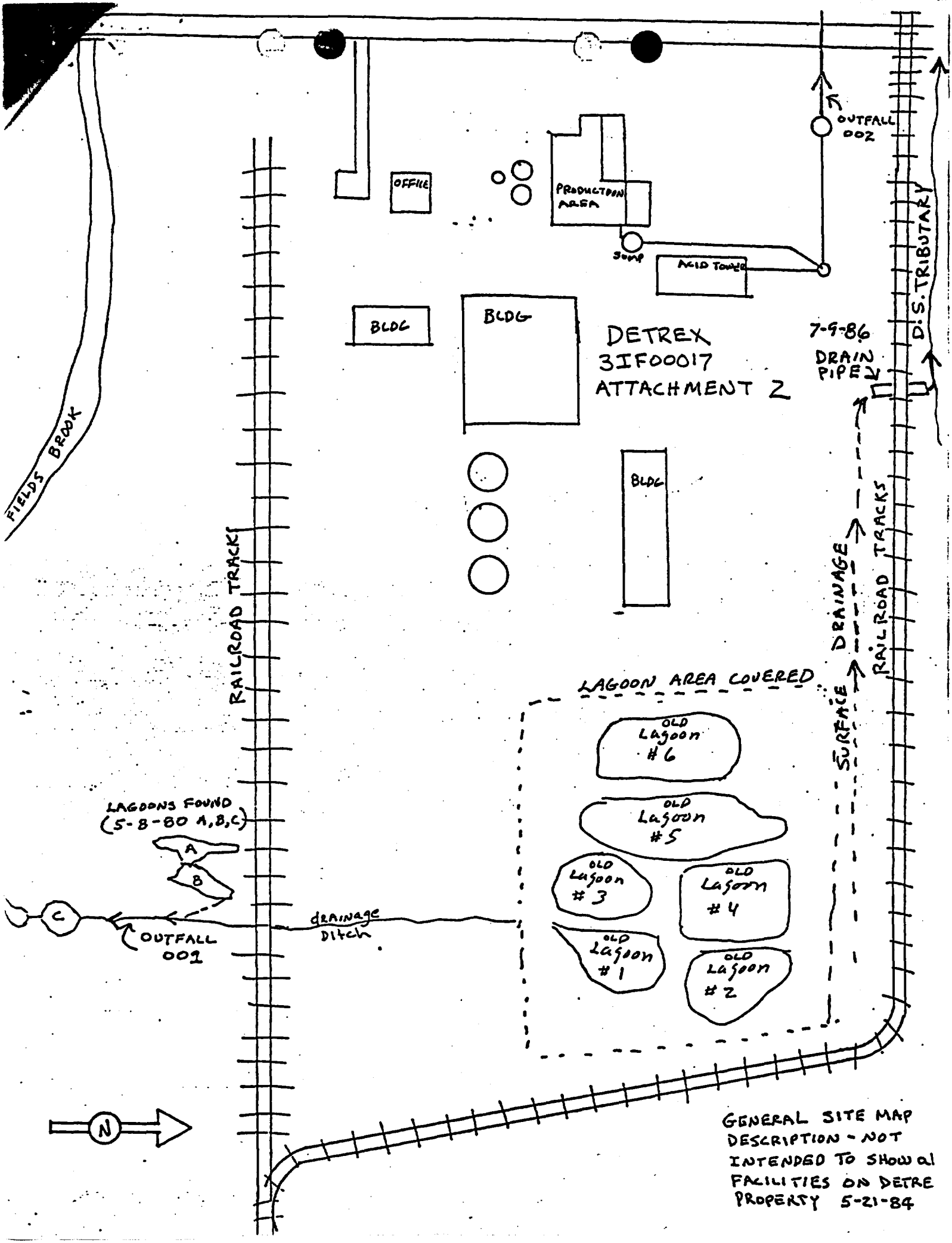
DEL:mjo

Enclosure

cc: R. Phelps, IWW, CO
USEPA c/o Phelps, IWW, CO



DETREX Chemical Industries INC
3IF00017*ED


OUTFALL 002
OFFICE
PRODUCTION AREA
SUMP
ACID TOWER
BLDG
BLDG
DETREX
3IF00017
ATTACHMENT 2
7-9-86
DRAIN PIPE
D.S. TRIBUTARY
FIELDS BROOK
RAILROAD TRACKS
BLDG
DRAINAGE
RAILROAD TRACKS
LAGOON AREA COVERED
SURFACE
OLD Lagoon #6
OLD Lagoon #5
OLD Lagoon #3
OLD Lagoon #4
OLD Lagoon #1
OLD Lagoon #2
LAGOONS FOUND (5-8-80 A,B,C)
A
B
C
drainage Ditch
OUTFALL 001
N
GENERAL SITE MAP DESCRIPTION - NOT INTENDED TO SHOW al FACILITIES ON DETRE PROPERTY 5-21-84

41

MAR 31 1982

5WQP-26

Mr. I. H. Shamiyeh
Manager of Corporate Engineering
Detrex Chemical Industries, Inc.
P.O. Box 501
Detroit, Michigan 48232

Dear Mr. Shamiyeh:

Enclosed is a copy of the U.S. Environmental Protection Agency's (U.S. EPA) field inspection report of the Detrex Chemical Company in Ashtabula, Ohio. This field inspection was done by the U.S. EPA on June 2 and 3, 1981.

In our meeting of January 10, 1982, we expressed concern about the high levels of hexachlorobenzene, hexachlorobutadiene, and heptachlor in the drainage ditch south of outfall 001. It is obvious that before your new NPDES permit can be issued, additional sampling must be done to confirm the presence of these toxic compounds and to determine the extent of the area that is contaminated. We will soon be contacting you to discuss what additional studies should be done at the Detrex facility in Ashtabula.

We again apologize for the delay in sending the inspection report to you. If you have any questions regarding the report or this letter, please feel free to call Gary Milburn ((312) 886-6112) or me (886-6115).

Sincerely,

Dana Davoli
Permits Section

Attachments 1 and 2

bcc: Milburn/Pratt (w/o Attachment)
Burack (WH-527) (w/Attachment 1)
Saulys/Kizlauskas (w/Attachment 1 & 2)
Kulma (w/Attachment 1)

Water Division

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V

DATE:

SUBJECT: Meeting with Detrex Chemical Company of Ashtabula, Ohio

FROM: Dana Davoli
Permit Section

TO: File

On February 10, 1982, the following U.S. EPA personnel met with Detrex Chemical Company to discuss their NPDES permit: Jerry Rogers, Gary Milburn, and Dana Davoli. Representing Detrex were Bob Emmett, W. Robrecht, I. Shamiyeh, and Jeff McNealey.

We indicated that as previously decided, the purpose of this meeting was to discuss with Detrex their proposals for reducing or eliminating the toxicants in their outfalls. We also briefly reviewed the results of Region V's Compliance Sampling Inspection report (CSI-T) on their facility which we had received just a few days earlier.

The CSI-T corroborated previous analyses done by Detrex which showed that three carcinogenic chlorinated solvents (trichloroethylene, tetrachloroethylene, and trichloroethane) are present in outfalls 001 and 002 at levels of concern to us. In addition, a sediment sample taken in the ditch south of outfall 001 showed high levels of hexachlorobenzene (HCB), hexachlorobutadiene (HCBD), and heptachlor. We indicated that at our request, the lab is rechecking the results on these last three compounds and as soon as they have finished, we will send Detrex a copy of the CSI-T. Given the fact that the high levels of HCB and HCBD in sediment and fish in the Ashtabula-Fields Brook area are of great concern to U.S. EPA and are the reason for our focus on this area, it will be necessary to have additional sampling done for these toxicants at the facility if our CSI-T results are correct. We will discuss this with Detrex in the future. Detrex said that they have no idea why HCB, HCBD, and heptachlor would be in the soil on their facility since, as far as they knew, neither their company nor the company who previously owned the site ever used or produced these compounds.

We then discussed options for control of the chlorinated solvents at outfall 002. We stated that since these are carcinogenic, our position is to reduce their discharge to the lowest level possible. Field data gathered by Calgon shows that, through the use of activated carbon, these toxicants can be reduced to less than 1 ppb (parts per billion) in wastewaters. We consider this technology to be best available technology (BAT) for these compounds. This is without consideration of economic factors. A brief discussion followed during which the company disputed our conclusion that the chlorinated solvents are carcinogenic and can and should be controlled to 1 ppb. Following this Detrex presented some options for controls they have discussed. Using 10 ppb as a target level for each of the chlorinated solvents in outfall 002, they estimated the cost for a system to collect contaminated water from the sources to outfall 002,

Water Division

Attachment 1

Visual Site Inspection Report 10/3/86

Detrex Chemical Industries Inc.
OHD 004 165 924
State Rd
Ashtabula Ohio

Attendance:
Mr Charles Guy - [redacted] Detrex Plant Manager
Mary Logan → technical contact
Robert Swale } USEPA
Kae Lee }

Conditions:
10/3 - mid 60s, light to heavy rain, saturated ground, alot of puddles + standing water

We met Mr Guy at the office and proceeded east along a dirt road to the area of the old waste piles and the drying bed. (See # 2 and 3 on the attached map) The area is cleared from a generally brushy area. There was a strong organic odor in this whole area but it was impossible to determine which SWMU the odors were eminating from (it could have been either or both)

air emissions

(2) The old waste pile area had been cleared of all piles + debris. The area was

covered with a scraggy grass that was untended. This area also had a rough path that seemed to have been made using slag from a neighboring plant

(3) The area that was a drying bed or a lagoon is still clearly evident. The area has not been closed or filled in. There was no large amounts of standing water just some puddles — indicating fairly porous soil since it had been raining off + on for a week. The bed area had no vegetation growing indicating soil contamination & Mr Guy thought that the lagoon / bed had not been used since the mid 1970s. & There was a drum in the mud which he stated was an empty drum that was used to demarcate the road.

(1) We then walked over to the area with the filled in lagoons. CERCLA inspection reports from 1975 indicate that there have been six lagoons in this area. Mr Guy was not sure when these lagoon ceased operations — he said he was not at the plant at that time. He said that closure consisted of removal of the sludge and some contaminated soil for disposal off-site. The lagoons were then filled with soil from a construction

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General Ashtabula Area
Hydro-geo discussion

NTH NEYER, TISEO & HINDO, Ltd.

30999 Ten Mile Road • Farmington Hills, Michigan 48024
~~(313) 471-0750~~
553-6300

RECONNAISSANCE HYDROGEOLOGY OF THE ASHTABULA, OHIO AREA

JUNE 12, 1981

INTRODUCTION

The City of Ashtabula County is located along Lake Erie in northeast Ohio. The city is situated at the mouth of the Ashtabula River which drains 127 square miles of watershed.

The topography of the area, shown on Plate 1, consists of a steep bluff along the Lake Erie shoreline which is breached by the Ashtabula River. At the top of the bluff, the ground surface is relatively flat with a gentle slope from south to north. This flat surface is termed the lake plain region.

Approximately four miles south of the Lake Erie bluffs, the lake plain meets a pronounced rise in topography referred to as the lake escarpment. This topographic feature is a glacial moraine or ridge that runs parallel to the lake shore and which is approximately two miles in width. The southern edge of the moraine is also the southern edge of the City of Ashtabula. Further south the topography is composed of subdued ridges parallel to the lake escarpment, and a rather broad and flat lowland marking the valley of the Grand River which flows north to the glacial moraine and then west to Painsville, Ohio.

Elevations range from 800 to 850 feet along the crest of the glacial moraine, and from 600 to 650 feet across the lake plain. Lake Erie has a mean elevation of approximately 572 feet above mean sea level.

The information developed in this report comes from numerous sources of geologic information as well as personal knowledge of the area. References used in the preparation of this report are listed at the back.

GEOLOGY

The general geology of the area consists of bedrock formations overlain by a mantle of unconsolidated materials deposited by the glaciers that occupied this area as recent as 14,000 years ago.

Bedrock Geology - The near surface bedrock is uniform and consists of a gray to black shale formed during the Devonian period. This shale is extensive

laterally and vertically. Its thickness in the Ashtabula area probably exceeds 300 feet.

Characteristically, the shale is fissle. This means it is thinly bedded and tends to break into thin plates. Interbedded with the shale are discontinuous lenses of coarser materials such as sandstone.

The shale is exposed along the Lake Erie shoreline where it forms steep bluffs, and along the bed of the Ashtabula River. Elsewhere it is buried beneath the glacial deposits.

Glacial Deposits - The glacial deposits overlying the bedrock are composed of three distinct types. The most common is glacial till which was deposited directly by glacial ice. Glacial till in the Ashtabula area consists of brown to gray silty clay containing various amounts of sand and gravel, as well as boulders. It is commonly referred to as "blue" clay. Normally the silty clay acts as a matrix in which the other materials are incorporated. However, in some cases the sand, or sand and gravel, is contained within a pocket. The glacial till ranges in consistency from stiff to very hard; it is generally of low plasticity, and is relatively impermeable. Glacial till occurs throughout the area. It is found at shallow depths beneath the lake plain and is the principal constituent of the glacial moraines.

The second most common glacial type is lacustrine clay. This material is found in the lake plain area as a thin veneer over the glacial till. It is composed of clayey silt and silty clay and locally contains fine sand. The material is generally soft to medium stiff, plastic in behavior, and relatively impermeable.

The third type of glacial material is outwash sand and gravels deposited by glacial streams. These are infrequently found in the Ashtabula area. They occur where the bedrock surface contains valleys previously occupied by the glacial streams. A major bedrock valley occurs beneath the Grand River in Saybrook Township (Cummins, 1959) but according to Pree (1960) does not contain significant deposits of sands and gravels. Other minor bedrock valleys might occur in the

Ashtabula area and some may contain sands and gravels. Normally the major bedrock valleys are oriented north-south and the minor bedrock valleys represent tributary systems with a more east-west orientation.

The thickness of the glacial deposits varies from zero to over 200 feet. In the lake plain area, the glacial deposits range from 25 to 50 feet in thickness. Beginning at the lake escarpment, the thickness of the glacial deposits increases abruptly reaching a maximum beneath the crest of the glacial moraine. Within the valley of the Ashtabula River the glacial deposits have been eroded and the underlying shale bedrock is exposed.

HYDROGEOLOGY

Hydrogeology is the study of the occurrence, movement and use of groundwaters. Groundwater is normally defined as water occurring within the pores or other openings of saturated geologic materials. It flows under the influence of gravity from areas of high fluid potential to areas of low fluid potential.

The amount of water available in a porous medium depends on the pore volume or porosity. However, due to adhesion, not all the pore volume can be drained. When the pores are very small the amount of water retained by adhesion is a large percentage of the total porosity. An example is clay. Clay has a high porosity, but the amount of drainable water, termed the specific yield, is small. It is because of this, and their low permeabilities, that clays are poor sources of water.

Normally, all materials beneath the water table are saturated. Water moves through these materials at various rates depending upon the permeability of the material. This is defined as the unit volume rate of flow per unit of cross section under a hydraulic gradient of 1.0. Materials with large interconnected pores or fractures will have a high permeability whereas materials with small interconnected pores will have a low permeability.

Groundwater Occurence - Although groundwater occurs in all saturated materials below the water table, usable quantities of groundwater are restricted to those

more permeable materials capable of yielding water to a well. Such formations are termed aquifers.

Within the Ashtabula area, neither the bedrock nor glacial deposits contain very productive aquifers. Most wells are finished in the shale bedrock at depths of 40 to 100 feet. Shale is a poor aquifer because it has a low specific yield as well as a low permeability. However, where thin sandstone layers are encountered within the shale sufficient water is usually found to support a yield of 5 to 10 gallons per minute. Such occurrences are infrequently found in the area.

Yields of less than 5 gallons per minute are more frequently found in wells completed in the shale. Such yields are indicative of fractures in the shale that have increased the overall permeability. It is not unusual for shale formations in this area to possess one or more fracture patterns. For this reason, the bedrock in the Ashtabula area possesses a secondary permeability and cannot be considered impermeable.

The glacial till and lacustrine clays are also poor sources of groundwater. Lacustrine clays are relatively impermeable and, in this area, too thin to yield a groundwater supply. Associated with the lacustrine clays are small linear ridges of fine sand found on the lake plain. These are former beaches and locally may be thick enough to yield water to a wellpoint.

Groundwater can also be obtained from sand and/or gravel pockets found in the glacial till. Such pockets are randomly distributed in the till. Their occurrence cannot be predicted. Water produced from the sand pockets is replenished slowly by seepage from the surrounding till. Yields are generally low depending on the size of the sand pocket.

Outwash deposits which may occur on the bedrock surface may also produce usable quantities of groundwater. Yield will be dependent on thickness. For this reason the more productive deposits are normally found where the bedrock surface forms a small valley.

Groundwater Movement - Groundwater in the Ashtabula area is recharged by the infiltration of precipitation into the ground. Because the surface materials consist mainly of glacial till or lacustrine clay, infiltration is low while surface runoff is high. Principal areas of recharge are the sandy beach ridges on the lake plain and the poorly drained areas along the glacial moraine.

Because of the clayey soils, subsurface drainage in the area is poor and a high water table is present except where the topography is steep. Farmers in the area rely on subsurface tiles to control the high water table and improve crop production.

Groundwater discharge occurs as evapotranspiration and as seepage to local streams. Lake Erie, the Ashtabula River and related tributaries are the major discharge points locally. Groundwater moves from areas of high topography toward areas of low topography. Movement is exceedingly slow due to the low permeability of the geologic materials. Seepage rates in the glacial till are estimated to be less than a few feet per year. This could increase by several orders of magnitude if more permeable deposits are encountered.

Groundwater Quality - Chemical constituents in groundwater vary over a wide range of concentrations. In general, the quality ranges from good to fair. Problem parameters include iron, manganese, hardness and total dissolved solids. Deeper waters are more mineralized than shallow water.

Water Balance - The area receives an average of 34.5 inches of rainrall per year. Stream flow in the Ashtabula River averages 17.4 inches per year. The difference is the average annual water loss by evaporation plus transpiration, or 17.1 inches per year. Thus, approximately 50 percent of the rainfall is lost back to the atmosphere while the other half is collected by streams and discharged to Lake Erie.

Of the half discharged by streams, a portion of that represents groundwater that seeped into the streams while most is surface runoff. The amount of

annual groundwater runoff is unknown, but may be in the range of one to four inches per year.

WASTE DISPOSAL/CONTAINMENT

The geology of the Ashtabula area is well suited for waste disposal practices. Natural geologic materials consist of clay rich deposits over relatively tight shales. Groundwater aquifers are poor. Most of the greater Ashtabula area is serviced by a public water supply and only the outlying rural areas are dependent on groundwater as a source of water supply.

The glacial till, locally referred to as a blue clay, is an excellent material for lining a waste disposal facility. The till should meet, or exceed, the requirements for a natural soil liner established by the Ohio EPA as well as the U.S. EPA Hazardous Waste Regulations.

Where lacustrine clays overlie the glacial till, these materials must be systematically sampled and tested because they may not fully qualify as a liner material.

The shale beneath the glacial till presents an excellent attenuation system as a backup for the clay liner. It should be systematically investigated to determine if any sandstone stringers are present. If sandstone is encountered, monitor wells may be required. Otherwise it is doubtful that a groundwater monitoring system will be needed.

Design of a disposal facility near Ashtabula or containment of an existing area should include precautions to insure that infiltration into the waste material is minimized.

Respectfully submitted,

Wayne R. Bergstrom

Wayne R. Bergstrom, P.E.

George R. Kunkle /jar

George R. Kunkle, Ph.D.

June 12, 1981

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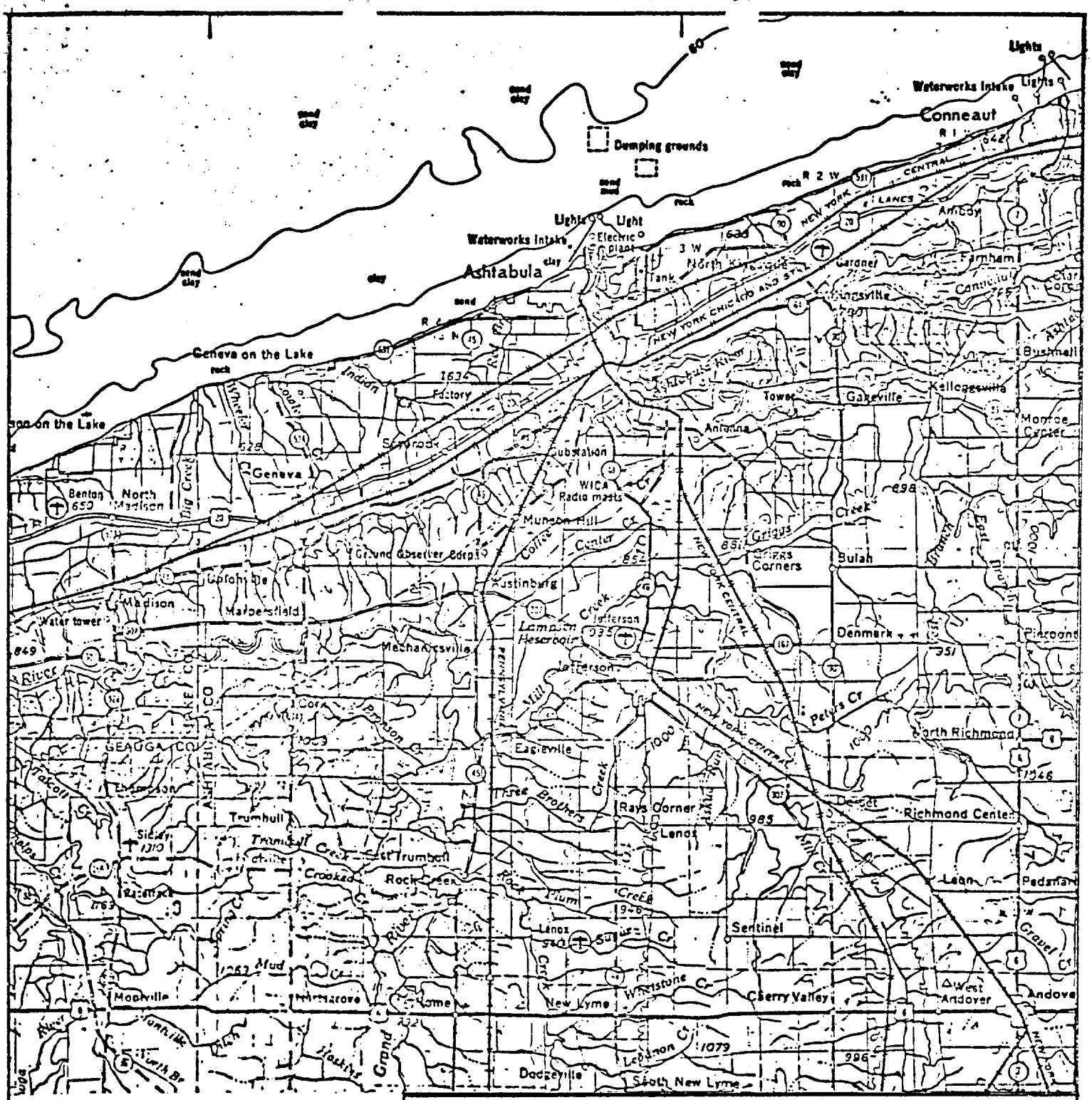


TOPOGRAPHIC AND CULTURAL FEATURES OF THE ASHTABULA AREA, OHIO

NEYER, TISEO & HINDO, LTD.
CONSULTING ENGINEERS
30999 TEN MILE RD. · FARMINGTON HILLS, MI 48024

PROJECT NO.: 42402	DRAWN BY: TWE	DATE: 6-10-81
SCALE: AS SHOWN	CHECKED BY: WRB	SHEET 1 OF 1

PLATE 1

44

SUBSURFACE INVESTIGATION
DETREX CHEMICAL INDUSTRIES INCORPORATED
STATE ROAD PLANT
ASHTABULA, OHIO

November 1981

BURGESS & NIPLE, LIMITED
Engineers
5085 Reed Road
Columbus, Ohio 43220

SUMMARY

1. The Ashtabula plant of Detrex Chemical Industries, Incorporated is underlain by glacial deposits that reach an overall thickness in excess of 26 feet. The bedrock occurring beneath the glacial deposits is the Ohio shale.

2. A hydrogeologic investigation consisting of 11 test borings was conducted on the plant property to determine the subsurface conditions. The test borings indicate the plant is underlain by persistent silty clay and clayey silt deposits. To the depth penetrated there were no materials encountered that could be considered groundwater aquifers. Clayey silt or silty clay deposits are present to a depth well below the elevation of Fields Brook. Due to the impermeable nature of these deposits, subsurface movement of contaminants from the plant operations to the stream is considered highly improbable.

3. No water seepage was noted in the majority of the glacial materials penetrated by the borings. Slight seepage occurred in a few isolated deposits consisting of a high percentage of silt size particles. Water level measurements made upon completion in some of the borings represent accumulated seepage in the borehole and not true groundwater levels. Because of this and the lack of any materials considered aquifers, it was not possible to determine the direction of groundwater movement on the plant property.

4. Laboratory testing of the subsurface materials indicates a very low permeability due to the high percentage of clay and silt size particles. The results of 11 of the 15 gradational analyses showed the total percent by weight of clay and silt to exceed 80 percent.

5. The results of the laboratory determination of the coefficient of permeability for four samples ranged from 2×10^{-6} centimeters per second to 9×10^{-8} centimeters per second. Deposits exhibiting these permeabilities are considered essentially impervious.

6. Review of existing information indicates no groundwater is available on the plant property. The borings confirmed that there are no aquifers present in the glacial deposits to the depth penetrated.

7. There are no groundwater users within 2,000 feet of the operations of the Detrex plant. A survey of existing establishments within this specified distance revealed that no water wells have existed at these facilities.

8. Potable and process water used at the facilities within 2,000 feet of the plant operations is furnished by two existing private water systems. Because of the lack of groundwater, the source for both of these systems is surface water.

INTRODUCTION

This report summarizes the investigation performed by Burgess & Niple, Limited pertaining to subsurface conditions at the Detrex Chemical Industries, Inc., plant located on State Road in Ashtabula, Ohio. The location of the plant property is shown on Figure 1. The scope of this investigation was mutually agreed upon by representatives of the Ohio Environmental Protection Agency (Ohio EPA), Detrex Chemical Industries, Incorporated, and Burgess & Niple, Limited.

The major objectives of the investigation were as follows:

1. Compile and review existing subsurface information in the area. This included a review of the soils, glacial geology, bedrock geology, and existing test borings completed at the site.

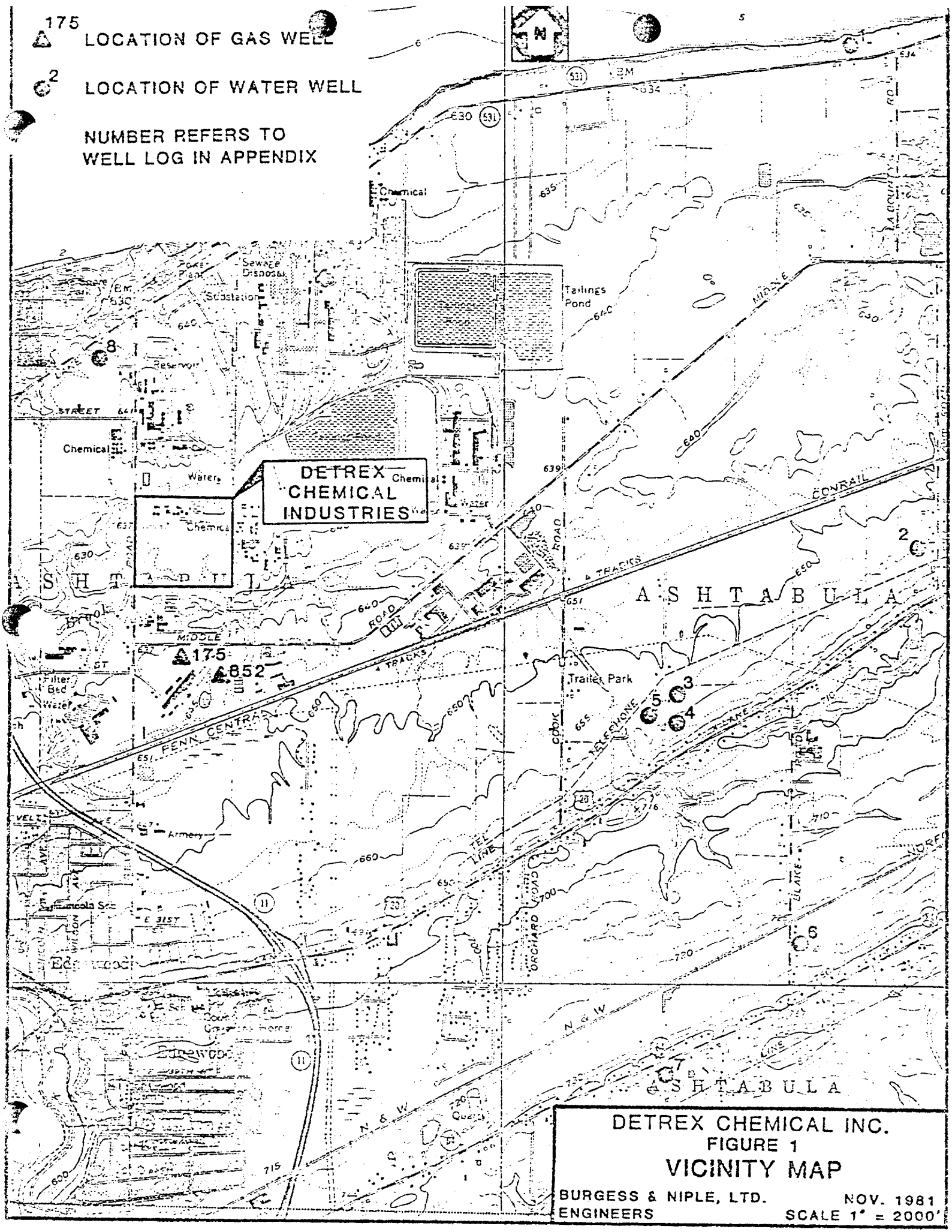
2. Locate from available information existing or abandoned water wells, oil and gas wells, or brine wells within 2,000 feet of the plant operations.

3. Evaluate the potential for groundwater development at and near the site.

4. Conduct a hydrogeologic investigation through the drilling of test borings to determine the on-site geologic and groundwater conditions and evaluate the results of the borings.

5. Prepare aerial mapping of the plant property and construct a site map at a scale of 1 inch = 50 feet with a 2-foot contour interval.

6. Perform a survey of water users within 2,000 feet of the plant operations and determine the source of their water supplies.



DETREX CHEMICAL INC.
FIGURE 1
VICINITY MAP
BURGESS & NIPLE, LTD. ENGINEERS
NOV. 1981
SCALE 1" = 2000'

EXISTING SUBSURFACE INFORMATION

Soils

Soil types within the southern half of the plant property belong to the Conneaut Soil Series, according to the "Soil Survey of Ashtabula County" published by the Ohio Department of Natural Resources in May 1973. This soil group is characterized as having been formed in lake deposited sediments consisting primarily of silt.

The Conneaut soils occur on nearly level land and are poorly drained. Due to their poor drainage and slow permeability, these soils exhibit seasonal wetness for long periods of time. Most areas of Conneaut soils are left idle due to these characteristics.

According to this soil report, the portion of the property in and around the manufacturing plant is described as "made land" due to the disturbance of the soils. This area contains a considerable amount of earth fill with the original soils being greatly altered or disturbed for construction of buildings, tanks, roadways, etc.

Glacial Geology

A preliminary review of available geologic and groundwater information was made to determine the general conditions in the vicinity of the Detrex Chemical plant. The plant and the surrounding area lie within the glaciated portion of Ohio. As glaciers advanced and retreated across Ohio, various types of materials were deposited either over the bedrock or the previous glacial deposits.

The surficial glacial deposits occurring on the plant property, according to "The Glacial Geology of Ashtabula County", published by the Ohio Department of Natural Resources in 1979, are lacustrine deposits. These deposits predominantly consist of silts deposited directly by the predecessor lakes to present day Lake Erie. The water level in the Lake Erie basin fluctuated with the advance and retreat of the glaciers

causing the northern third of Ashtabula County to be inundated on several occasions. The thickness of these lake deposited silts is estimated to be on the order of 5 to 10 feet on the plant property.

Glacial till consisting of a mixture of clay, silt, and some sand size particles occurs below the lacustrine deposits. The till was deposited or dropped directly beneath the receding glaciers. Due to the high percentage of clay and the dense nature of glacial tills, the capacity to store or transport is very low. The thickness of the glacial till deposits present on the plant site are estimated to be approximately 20 feet. Therefore, the total thickness of the glacial materials is on the order of 30 feet.

The location of water wells on record within the Ohio Department of Natural Resources are shown on Figure 1. Copies of the drilling reports and logs for these wells are included in the Appendix. In general, these logs indicate the thickness of the glacial deposits within a 2.5 mile radius of plant property varies from 11 to 60 feet.

The glacial deposits encountered in these wells are identified as primarily consisting of clay. It should be noted that water well drillers commonly do not differentiate between clay and silt deposits. Sands and gravels were identified within the glacial deposits encountered in Wells 7 and 8. Both of these wells are situated along beach ridges associated with high water levels in the Lake Erie basin. These beach ridges are typically composed of well sorted sand and gravel. The "Glacial Geology of Ashtabula County" indicates the nearest beach ridge deposits to the plant are situated at least 1/2 mile to the north near Lake Erie and south of Fields Brook near Middle Road. There are no known beach ridge deposits on the Detrex plant property.

In June 1981, the firm of Testing Engineers and Consultants, Inc., was retained by Detrex Chemical to conduct preliminary test borings on the plant site. Thirty-two borings in all were drilled with the majority being located in the northern third of the site near the buildings and manufacturing facilities. The borings ranged from 2 feet to 15 feet in

depth. These borings were drilled to a shallow depth in order not to penetrate underlying impermeable or confining deposits. Eight of the borings, primarily located in the southern portion of the plant property near Fields Brook, were drilled to a depth of 2 to 4 feet using hand augers.

The majority of the test holes penetrated fill material that varied in thickness from 0.5 to 6.5 feet. In general, a brown silty clay was encountered in the borings beneath the fill materials. Occasional thin seams of silt or silty sand were found within the brown silty clay deposits. A gray to blue silty clay was penetrated beneath the brown silty clay at depths varying from 7 to 12 feet.

Observations made by the contractor during the drilling indicated slight water seepage occurring within very thin silt seams. These silts seams were on the order of several inches in thickness. There was no indication of any water seepage in 18 of these borings. Water was encountered in silty sand lenses in three of the borings. The thicknesses of these silty sand lenses were on the order of 1 foot or less.

Bedrock Geology

The bedrock present beneath the area is the Ohio shale of Devonian age. In the northeastern portion of the state, the Ohio shale has been subdivided into the Cleveland, Chagrin, and Huron members. The Chagrin member or middle unit occurs beneath the glacial deposits at the plant site. This is a bluish-gray siliceous shale containing a few, very thin calcareous sandstone beds.

The thickness of the Ohio shale throughout the state is quite variable. In Ashtabula County the thickness is probably on the order of 1,500 feet. The shale has very limited economical value and being highly impermeable is not a source of groundwater. The Chagrin shale along with the overlying glacial till have been used for the manufacture of hollow tile and brick in the county.

Water Wells

A review of the ODNR water well records indicate no water supply wells, either in use or abandoned, are located within 2,000 feet of the Detrex plant. During the detailed phase of this project all establishments within 2,000 feet of the plant operations were contacted to determine the existence of water supply wells. It should be noted that state regulations for hazardous and solid waste disposal sites require a waiver for water wells located only within 1,000 feet of the site.

As previously mentioned, Figure 1 shows the locations of water wells in Ashtabula Township that have been field verified by ODNR. The distances of these wells from the plant property lines vary from approximately 4,000 feet to in excess of 13,000 feet. The well log and drilling report for each of these wells is included in the Appendix.

Oil and Gas Wells

The oil and gas records on file at the Ohio Department of Natural Resources show two gas wells have been drilled within 2,000 feet of the Detrex property. The locations of these wells are shown on Figure 1 and the drilling reports are included in the Appendix. Well 852 was drilled in 1977 to a depth of 2,960 feet. It produced gas from the Clinton formation encountered at a depth of 2,715 feet. The current producing status of this well is not known. The Ohio shale was logged as the uppermost bedrock at the well site with a total thickness of 1,433 feet. The other well (175) was drilled originally to a depth of 700 feet and then abandoned in 1962. There was no information filed concerning the geologic formations encountered in drilling the well.

Brine Wells

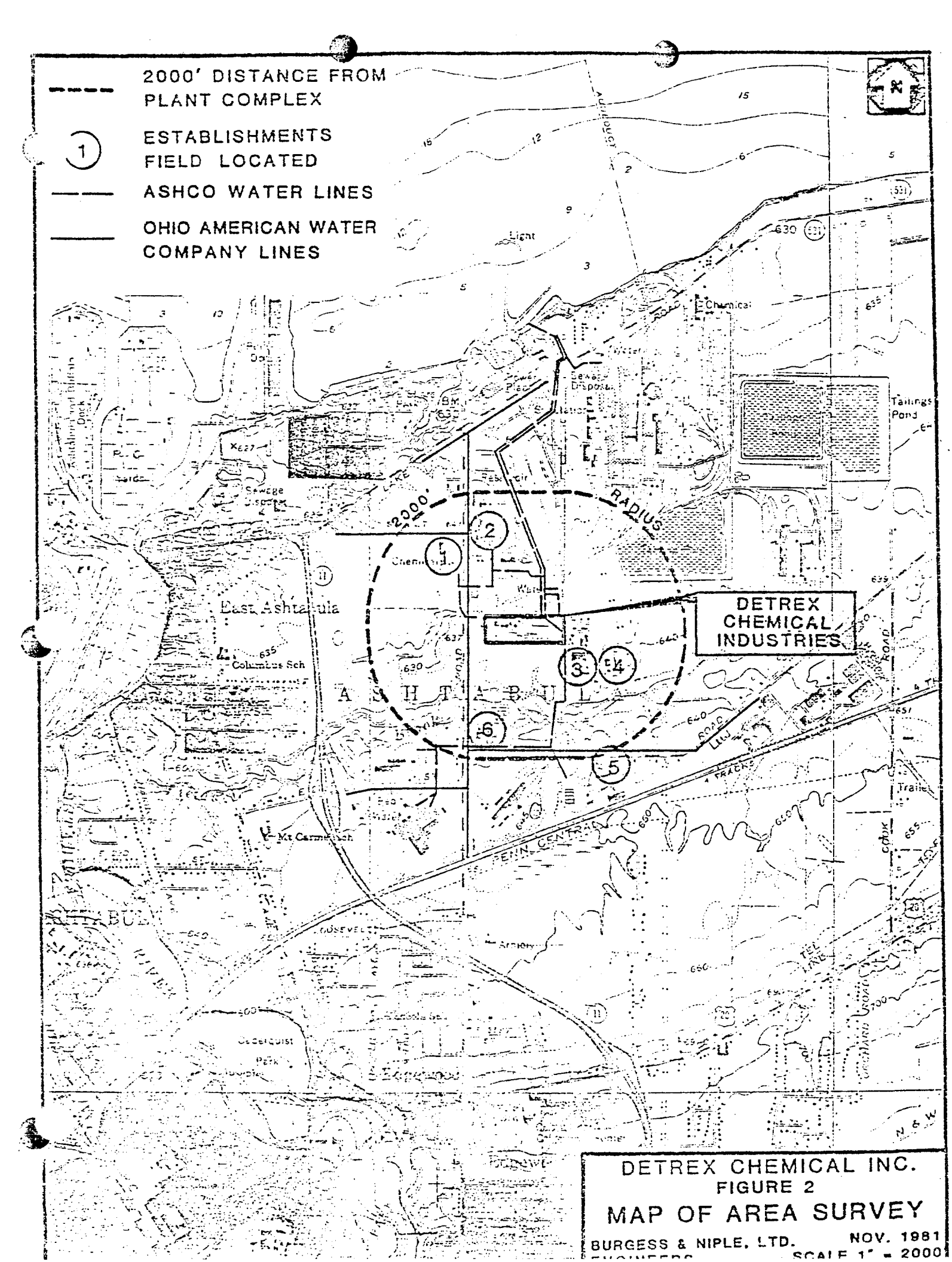
There is no record of any brine or salt wells having been drilled within 2,000 feet of the plant property. There is also no record of brine wells in all of Ashtabula Township.

Water Supply Development

The potential for development of a groundwater supply in the vicinity of the Detrex plant site is extremely poor due to the impermeable characteristics of the glacial deposits and the shale bedrock. A review of the records of the drilled wells included in the Appendix indicates limited groundwater is obtained from either the upper few feet of the weathered shale bedrock or from joints and bedding planes within the unweathered bedrock. Due to the high organic and pyritic content of the shale, the meager amounts of water present within the bedrock is of extremely poor quality. Wells located in the areas of the glacial beach ridges potentially could obtain water from the sands and gravels within these deposits.

According to the "Groundwater Resources of Ashtabula" published in 1978 by the Ohio Department of Natural Resources, the availability of groundwater is less than 3 gallons per minute in the vicinity of the plant. This publication indicates that many drilled wells are dry and cisterns or dug wells are necessary to supply even minimal domestic supplies. The testing completed as part of this project supports this general statement in that the borings encountered either no groundwater or only minor seepage zones.

Potable water and process water supplies are readily available at the Detrex plant site from two purveyors. The Ohio American Water Company, a private water supply system serving the City of Ashtabula and surrounding areas, has water supply mains throughout the entire area. The Ashco Water Company, also a private water supply system, provides nonpotable or process water for the industries in the area. The source of both of these supply systems is surface water. The locations of the supply mains for these two systems within 2,000 feet of the plant property are shown on Figure 2.



DETREX CHEMICAL INC.

FIGURE 2

MAP OF AREA SURVEY

BURGESS & NIPLE, LTD. NOV. 1981

SCALE 1" = 2000

SUBSURFACE INVESTIGATION

Drilling Procedure

The hydrogeologic investigation of the plant property consisted of 11 test borings drilled on October 12 and 13, 1981. The location of the borings were agreed upon by representatives of the Ohio EPA, Detrex Chemical Industries, Incorporated, and Burgess & Niple, Limited. These boring locations are shown on the site plan in the back of the report. Twelve borings had been proposed on the site. However, due to the inaccessibility to the east central portion of the site, proposed Boring 9 was not drilled. Extremely wet, swampy conditions indicating impermeable soils and subsurface materials were noted throughout the property. These conditions were especially prevalent in the central, eastern, and southern portions of the site. Representatives of Detrex Chemical Industries, Incorporated and Burgess & Niple, Limited were present during the drilling operations.

The borings were advanced using continuous flight auger equipment through the oxidized glacial deposits and were terminated in the unoxidized portion of these deposits. Continuous soil sampling was performed in 1.5-foot increments, along with the development of standard penetration data. The depths initially penetrated varied from 3 to 19.5 feet, with the average depth being slightly more than 10 feet. Borings 2, 3, 5, and 6, located in the vicinity of the manufacturing operations, were terminated above the unoxidized zone due to concern for migration of any shallow subsurface contaminants by way of the open borehole. Immediately upon completion, the boreholes were sealed with bentonite.

During November 9 through 11, 1981 each of the 11 boring sites were drilled at least an additional 4.5 feet. An attempt was made to drill as near as practically possible to the location of the initial boring. In general, this deeper boring was horizontally within several feet of the original boring. It was intended that the drilling would continue at all the boring locations to a point where at least 4.5 feet of unoxidized glacial deposits consisting primarily of clay-size particles would

be penetrated. The percentage of clay present was determined by visual examination of the material within the split-tube sampler. As mentioned previously in this report, the primary glacial deposits present at the site is a clay till consisting of varying percentages of clay, silt, and some sand size particles. Due to the varying percentages of these particles, it was necessary in some cases to drill more than 4.5 feet to encounter predominantly clay material. The total additional drilling in each boring varied from 4.5 feet to 22.5 feet, with the average being approximately 9.5 feet. Samples obtained from the split-tube sampler in each of the borings were collected by representatives of Detrex Chemical Industries, Incorporated, for laboratory analyses. This will be further discussed in the section laboratory testing.

Site Conditions

In general, the glacial materials penetrated in these borings varied from silty clays to clayey silts indicative of glacial lacustrine and till deposits. Figure 3 graphically indicates the type and thickness of materials encountered in the borings as well as the approximate elevation of Fields Brook. A thin lense of sandy silt or sandy clay was encountered in Borings 2, 4, and 10. The thickness of these lenses varied from less than 1 foot to 2.5 feet. The overall depth of glacial deposits penetrated in these borings varied from 15 to 25.5 feet. It was estimated that the depth to bedrock at the plant site would be approximately 30 feet. This estimate remains reasonable as bedrock was not encountered in any of these borings. These borings were also sealed immediately upon completion with a bentonite grout.

Using the information obtained from Borings 1, 2, and 3 a cross section through the plant property in a west to east direction was constructed and is shown on Figure 4. A cross section from north to south at the locations of Borings 2, 5, 8, and 11 is shown on Figure 5. As can be seen in both Figures 3 and 5, silty clay and clayey silt deposits occur well below the bottom of Fields Brook. A detailed description of the materials are included in the boring logs in the Appendix.

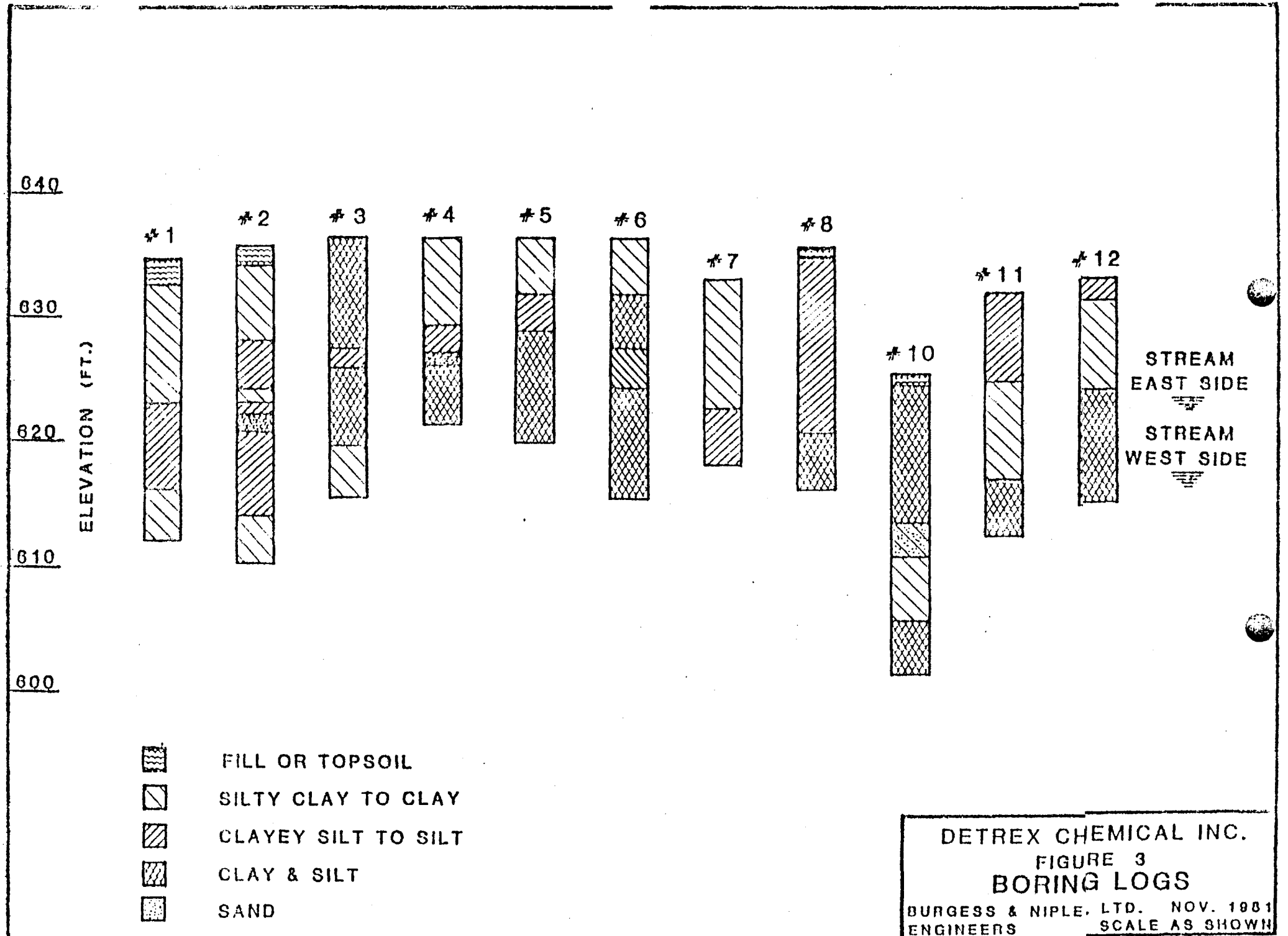
During the drilling, special attention was made of the occurrence of any water in the glacial deposits. Some slight seepage was noted in those materials containing higher percentages of silt size particles or in the very thin silt seams. These materials were underlain with less permeable clayey deposits, and therefore, are interpretated as representing small "perched" water conditions. None of the deposits encountered during the drilling would be considered groundwater aquifers or even capable of transmitting significant quantities of water.

Water level measurements were attempted at the time of completion of each of the borings. Several of the borings had no water present so water measurements are lacking. The remainder of the borings penetrated one or more minor seepage zones. Since all these borings were terminated in predominantly clay materials, the water levels represent accumulated water in the borehole from the seepage zones. These levels are therefore not the true groundwater levels. This, in addition to the absence of any aquifers, makes it impossible to determine the direction of groundwater movement on the plant property.

Laboratory Testing

The physical laboratory testing of the materials obtained from the borings was performed in accordance with standard soil testing procedures. Particle size gradational analyses were performed on 15 samples obtained during the detailed investigation. The results of the gradational analyses are given in Table 1. In general, the analyses indicate the total percentage of silt and clay size particles in 11 of the samples exceed 80 percent. In the remainder of the samples, the total percentage of these particles exceeded 64 percent. The higher the percent of these fine size particles the less likely the material will be able to transmit water and, therefore, the lower the permeability.

Four undisturbed samples were obtained during the initial drilling phase for determination of the coefficient of permeability. The samples were procured by hydraulically pressing a 3-inch outside diameter, thin wall sampling tube. Laboratory values for the coefficient of permeability using triaxial testing equipment varied from 2×10^{-6} centimeters

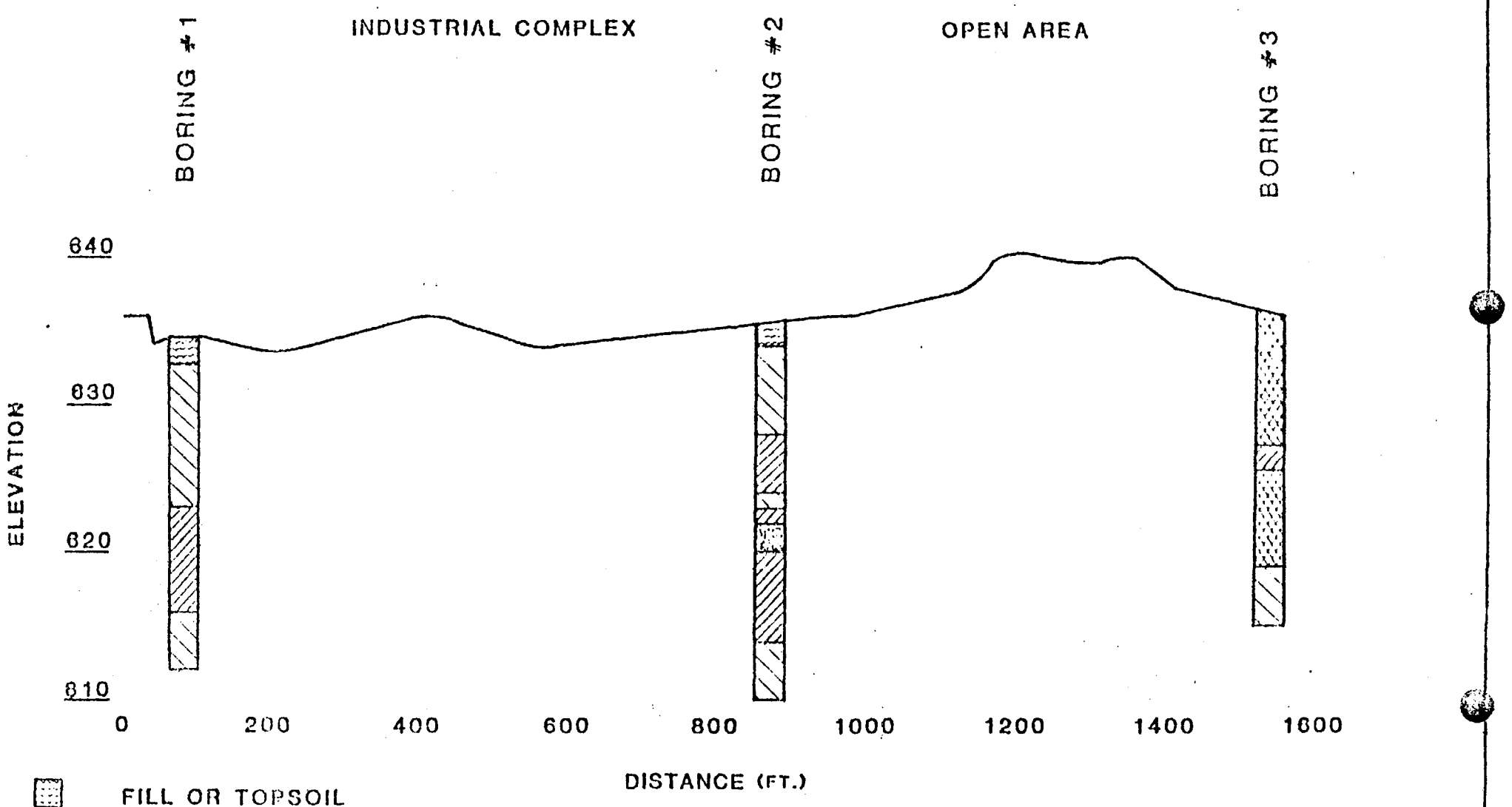


DETREX CHEMICAL INC.

FIGURE 3

BORING LOGS

BURGESS & NIPLE, LTD. NOV. 1981
ENGINEERS SCALE AS SHOWN



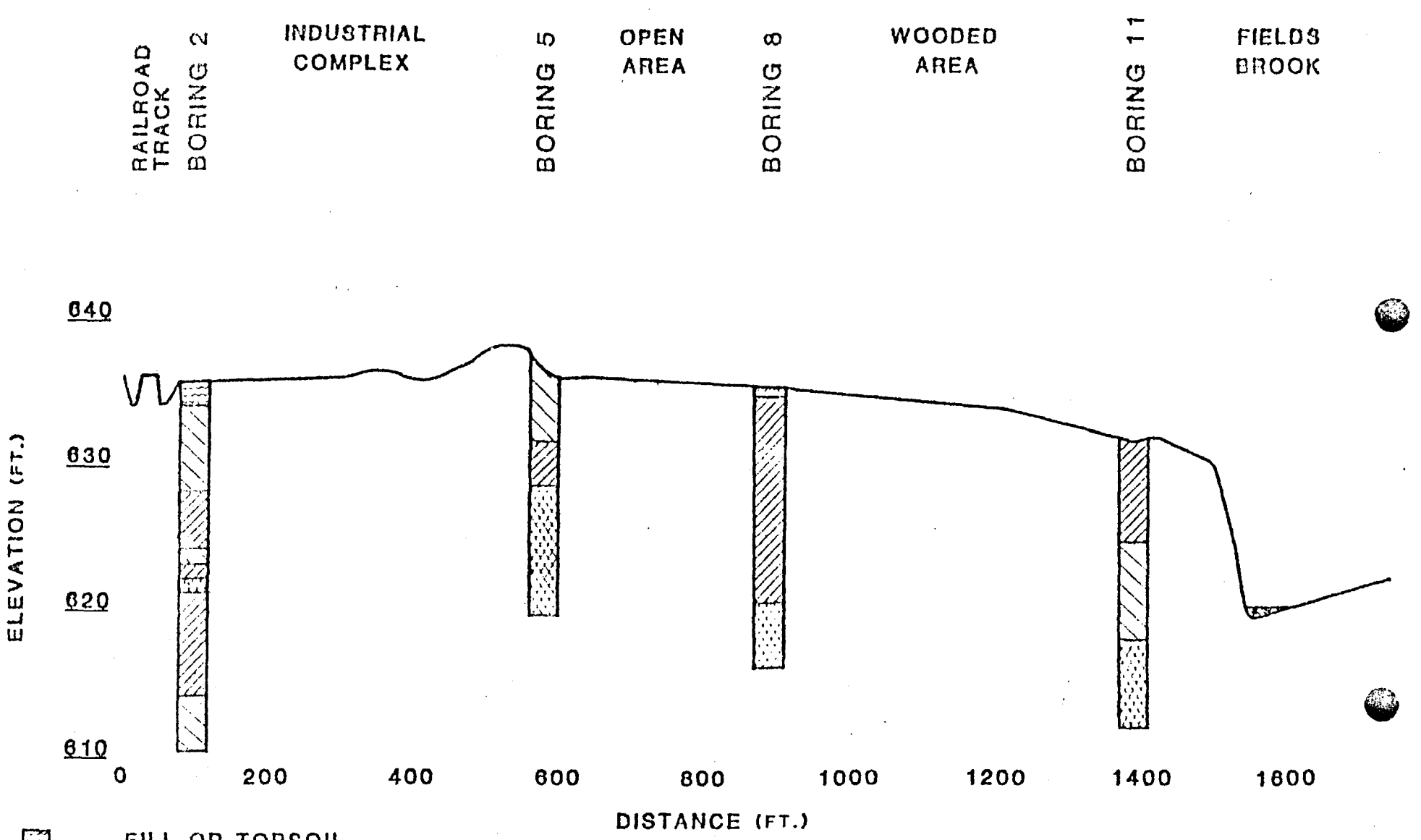
DETREX CHEMICAL INC.

FIGURE 4

WEST TO EAST SECTION

BURGESS & NIPLE, LTD.
ENGINEERS

NOVEMBER, 1981



DETREX CHEMICAL INC.

FIGURE 5

NORTH TO SOUTH SECTION

BURGESS & NIPLE, LTD.
ENGINEERS

NOVEMBER 198

per second to 9×10^{-8} centimeters per second. The values for the four samples are also shown in Table 1. Based on a comparison of the other particle size gradational analyses and the classification of the materials, it is concluded that the glacial deposits underlying the plant property would have similar values for the coefficient of permeability and would be considered essentially impervious. Materials exhibiting coefficients of permeability 1×10^{-7} centimeters per second or less are considered excellent impervious materials for secure or hazardous waste disposal sites. Only the soil sample from Boring 3 had a permeability greater than this value.

As previously mentioned, samples of the materials penetrated in the deeper phase of the drilling were collected for laboratory chemical analysis. One sample was taken from each 1.5 foot drive of the split-tube sampler. Except for Borings 2 and 12, a total of four samples were collected to represent the deepest portion of the boring. Three soil samples were collected from those two borings. The samples were taken from the split-tube sampler and placed in glass containers. The details of sample preparation for gas chromatography and mass spectrometry (GC/MS) analysis are covered separately in a report prepared by Detrex Chemical Industries, Incorporated.

Area Survey

As a part of the subsurface investigation, a survey was made of all establishments within 2,000 feet of the Detrex plant and buildings. This survey was to provide the basis for determining the sources of water supplies in that area. A listing of the six establishments within that specified distance is given in Table 2. The location of these establishments is shown on Figure 2.

Table 1

DETREX CHEMICAL INDUSTRIES, INCORPORATED
ASHTABULA PLANT

Results of Gradation and Permeability Tests

Boring Number	Sample Number	Gradation*						Coefficient of Permeability
		Aggregate	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	
1	P3	0	0	0	1	62	37	9×10^{-8} cm/sec
1A	3	1	0	2	7	41	49	-
2A	3	2	3	5	10	51	29	-
3	P1	0	1	0	1	81	17	2×10^{-6} cm/sec
3A	8	1	3	4	7	53	32	-
4	P1	4	1	2	3	63	27	2×10^{-7} cm/sec
4A	3	0	0	1	3	55	41	-
5A	4	0	0	0	0	60	40	-
6A	5	1	0	0	1	62	36	-
7A	2	2	2	5	12	50	29	-
8	P1	0	1	1	2	63	33	9×10^{-8} cm/sec
8A	6	5	2	4	4	45	40	-
10A	3	7	15	6	8	31	33	-
11A	2	9	15	5	6	34	31	-
12A	3	2	7	8	10	45	28	-

*Results expressed in percent by weight performed by short hydrometer test.

Table 2

DETREX CHEMICAL INDUSTRIES, INCORPORATED
ASHTABULA, OHIO PLANT

Survey of Surrounding Establishments*

Map No.	Owner	Address
1	Diamond Shamrock	State Road
2	RMI Company - Sodium Plant	State Road
3	General Tire Company	Middle Road
4	Olin Chemicals	Middle Road
5	G&W - Natural Resources Group - Chemical Division	Middle Road
6	G&W - Titanium Tetrachloride Plant	State Road

*Located within 2,000 feet of Detrex Chemical plant.

Contact was made with representatives of each of these manufacturing plants to determine the source of water used at the plants. In all cases, the plants were served by either or both of the private water purveyors mentioned earlier in the report. The representatives of these plants further indicated that no on-site wells were currently or previously used as a source of either potable or process water. The reliance of these plants on the Ohio American Water Company and the Ashco Water Company is necessary because of the unavailability of groundwater.

CONCLUSIONS

The property of the Ashtabula plant of Detrex Chemical Industries, Incorporated, is underlain by at least 26 feet of unconsolidated materials consisting of glacial lacustrine and till deposits. The estimated total thickness of the glacial deposits at the plant is 30 feet. The Chagrin member of the Ohio shale is the bedrock occurring beneath the glacial deposits.

Eleven test borings were drilled over the entire plant property to determine the site geological and groundwater conditions. The glacial materials penetrated in these borings varied from silty clays to clayey silts. A few thin isolated lenses of sandy silt and sandy clay were encountered in three of the borings. The depth of penetration of the borings varied from 15 to 25.5 feet. Borings 10, 11, and 12 located near the southern property boundary showed silty clay or clay silt deposits present to a depth well below the streambed of Fields Brook. Due to the impermeable nature of these deposits, subsurface movement of contaminants from the plant operations to the stream is considered highly improbable.

Groundwater observations made during the drilling indicate slight seepage occurs within the materials containing a high percentage of silt size particles and in the thin silt seams. No seepage was noted in the majority of the materials penetrated. Based on physical and water-bearing characteristics, none of the deposits encountered during the drilling would be considered groundwater aquifers. Since no groundwater was present, the direction of groundwater movement could not be determined.

Particle size gradational analyses were performed on one or more samples from each of the borings. The results of the analyses show the predominant particle sizes to be clay and silt. Eleven of the analyses showed the total percentage by weight of clay and silt particles to be in excess of 80 percent.

Laboratory determination of the coefficient of permeability on four undisturbed samples indicates the glacial deposits are essentially impervious. The laboratory values varied from 2×10^{-6} centimeters per second to 9×10^{-8} centimeters per second. Comparing the physical characteristics of these four samples with the others, it is concluded that the glacial deposits underlying the Detrex plant property are essentially impervious.

Groundwater at the plant property is essentially nonexistent due to the impermeable nature of the glacial deposits and the underlying shale bedrock. Of the plants surveyed within 2,000 feet of the Detrex operations, none utilize groundwater as a source of either potable or process water. The representatives contacted at each plant further indicated that water wells have never existed or been used at their facilities. Potable and process water used at these plants is obtained from the existing private water systems.

SUMMARY TABULATION OF SHRADER REPORTS OF NOV. 11 & 12, 1981

(GC/MS)

	DEPTH OF CORE SAMPLE (From face) FT.	METHYLENE CHLORIDE	1,1,2,2, TETRA CHLOROETHANE	TETRACHLORO ETHYLENE	1,2-t-DICHLORO ETHYLENE	TRICHLORO ETHYLENE
1A	17.5-18.0	ND	ND	ND	ND	ND
	18.0-19.5	ND	ND	ND	ND	ND
	19.5-21.0	ND	ND	ND	ND	ND
	21.0-22.5	ND	ND	ND	ND	ND
2A	21.0-22.5	ND	2116.4	75.8	9.8	260.2
	22.5-24.0	ND	43.7	ND	ND	6.4
	24.0-25.5	ND	12.1	ND	ND	ND
3A	15.0-16.5	ND	ND	ND	ND	30.8
	16.5-18.0	ND	ND	ND	ND	5.2
	18.0-19.5	ND	ND	ND	ND	ND
	19.5-21.0	ND	6.8	12.1	ND	144.9
4A	10.5-11.0	ND	ND	ND	ND	ND
	11.0-12.0	ND	ND	ND	ND	ND
	12.0-13.5	ND	ND	ND	ND	ND
	13.5-15.0	ND	ND	ND	ND	ND
5	10.5-12.0	6406.3	ND	ND	8.1	31.8
	12.0-13.5	594.5	ND	ND	5.1	10.1
	13.5-15.0	158.0	ND	ND	ND	ND
	15.0-16.5	350	ND	ND	ND	ND
6A	15.0-16.5	ND	ND	ND	ND	ND
	16.5-18.0	6.5	ND	ND	ND	ND
	18.0-19.5	ND	ND	ND	ND	ND
	19.5-21.0	ND	ND	ND	ND	7.4
7A	10.5-11.0	ND	ND	ND	ND	ND
	11.0-12.0	ND	ND	ND	ND	ND
	12.0-13.5	ND	ND	ND	ND	ND
	13.5-15.0	ND	ND	ND	ND	ND
8A	13.5-15.0	ND	ND	ND	ND	ND
	15.0-16.5	ND	ND	ND	ND	ND
	16.5-18.0	ND	ND	ND	ND	ND
	18.0-19.5	ND	ND	ND	ND	ND

(GC/MS)

DEPTH OF CORE SAMPLE (From Surface) FT.		METHYLENE CHLORIDE	1,1,2,2, TETRA CHLOROETHANE	TETRACHLORO ETHYLENE	1,2-t-DICHLORO ETHYLENE	TRICHLO ETHYLEN
10A	19.5-20.0	ND	ND	ND	ND	ND
	20.0-21.0	ND	ND	ND	ND	ND
	21.0-22.5	ND	ND	ND	ND	ND
	22.5-24.0	ND	ND	ND	ND	ND
11A	15.0-15.5	ND	ND	ND	ND	ND
	15.5-16.5	ND	ND	ND	ND	ND
	16.5-18.0	ND	ND	ND	ND	ND
	18.0-19.5	ND	ND	ND	ND	ND
12A	13.5-15.0	15.3	ND	ND	ND	ND
	15.0-16.5	16.8	ND	ND	ND	ND
	16.5-18.0	ND	ND	ND	ND	ND
WATER BLANK		7.8	ND	ND	ND	ND

NOTE 1: ALL CONCENTRATIONS IN MICROGRAMS/LITER.

NOTE 2: THE CONTENTS OF THE WATER BLANK WERE NOT SUBTRACTED FROM THE RESULTS LISTED ABOVE.

DEC 4 1981

Appendix only - OHEPA/GLO has report content

SUBSURFACE INVESTIGATION

There is a large plate showing boring locations OEPA has original & we need a copy. Kim Larson

DETREX CHEMICAL INDUSTRIES, INCORPORATED

ASHTABULA, OHIO

NOVEMBER, 1981

Burgess & Niple, Limited
Engineers

WATER WELL LOGS

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus, Ohio 43212

PLEASE USE PENCIL OR TYPEWRITER
DO NOT USE INK.

No 347752

County Ashtabula Township Ashtabula Section of Township

Owner Robert Fairburn Address [redacted]

Location of property [redacted]

CONSTRUCTION DETAILS

Casing diameter 6" O.D. Length of casing 65'
Type of screen Length of screen
Type of pump
Capacity of pump
Depth of pump setting
Date of completion 9-17-65

BAILING OR PUMPING TEST

Pumping Rate 10 G.P.M. Duration of test 8 hr
Drawdown 170 ft. Date 9-17-65
Static level-depth to water 30 f
Quality (clear, cloudy, taste, odor) salty
Pump installed by

WELL LOG*

Formations Sandstone, shale, limestone, gravel and clay	From	To
clay	0 Feet	60 Ft.
shale	60	200

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.

[redacted]

Drilling Firm HAROLD INMAN WELL DRILLING Date
Address RT. 2 JEFFERSON, OHIO Signed Harold Inman

*If additional space is needed to complete well log, use next consecutive numbered form

Water Well 1

WELL LOG AND DRILLING REPORT

ORIGINAL

PLEASE USE PENCIL OR TYPEWRITER DO NOT USE INK.

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus 12, Ohio

No. 284603

County Ashtabula Township Ashtabula Section of Township

Owner Daniel Sowalla Address

Location of property [redacted]

CONSTRUCTION DETAILS

Casing diameter 8" Length of casing 19'4"
Type of screen Length of screen
Type of pump
Capacity of pump
Depth of pump setting
Date of completion

BAILING OR PUMPING TEST

Pumping Rate G.P.M. Duration of test hrs.
Drawdown ft. Date
Static level-depth to water ft.
Quality (clear, cloudy, taste, odor)

Pump installed by

WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
Clay	0 Feet	14 Ft.
Shale	14	30
WATER 25 ft		

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.

N.

[redacted]

W.

S.

See reverse side for instructions

Drilling Firm Paul McGill Date Aug. 20, 1962

Address RFD #2 Ashtabula, Ohio Signed Paul McGill

Water Well 2

WELL LOG AND DRILLING REPORT

ORIGINAL

PLEASE USE PENCIL OR TYPEWRITER DO NOT USE INK.

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus 12, Ohio

No 309866

County Ashtabula Township Ashtabula Section of Township

Owner Loyd Weaver Address [redacted]

Location of property [redacted]

CONSTRUCTION DETAILS

Casing diameter 6" Length of casing 45'4"

Type of screen Length of screen

Type of pump

Capacity of pump

Depth of pump setting

Date of completion

BAILING OR PUMPING TEST

Pumping Rate 3 G.P.M. Duration of test hrs.

Drawdown ft. Date June 30, 1964

Static level-depth to water ft.

Quality (clear, cloudy, taste, odor)

Pump installed by

WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
	0 Feet	8 Ft.
Clay	8	27
Shale	27	35

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.

N.

[redacted]

W. E.

S.

See reverse side for instructions

Drilling Firm M.R. Paul McGill Date June 30, 1964

Address Harrisonburg Signed Paul McGill

Water Well 3

WELL LOG AND DRILLING REPORT

ORIGINAL

PLEASE USE PENCIL OR TYPEWRITER. DO NOT USE INK.

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus, Ohio

No. 274785

County ASHTABULA Township Ashtabula Section of Township

Owner DALE COLESH Address [redacted]

Location of property [redacted]

CONSTRUCTION DETAILS

Casing diameter 8" Length of casing

Type of screen Length of screen

Type of pump

Capacity of pump

Depth of pump setting

Date of completion

BAILING OR PUMPING TEST

Pumping rate G.P.M. Duration of test hrs.

Drawdown ft. Date June 22, 62

Developed capacity

Static level—depth to water 2½ min. ft.

Pump installed by

WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
	0 Feet	10 Ft.
CLAY	10	25
SHALE	25	35
WATER AT 35 ft		

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.

N.

[redacted]

W.

S.

See reverse side for instructions

Drilling Firm [illegible] Date June 22, 1962

Address [illegible] Signed [illegible]

WELL LOG AND DRILLING REPORT

ORIGINAL

NO CARBON PAPER NECESSARY— SELF-TRANSCRIBING

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
65 S. Front St., Rm. 815 Phone (614) 469-2646
Columbus, Ohio 43215

No. 420870

County Ashtabula Township Ashtabula Section of Township

Owner martin Williams Address [redacted]

Location of property [redacted]

CONSTRUCTION DETAILS

Casing diameter 6" Length of casing 40

Type of screen Length of screen

Type of pump

Capacity of pump

Depth of pump setting

Date of completion

BAILING OR PUMPING TEST
(Specify one by circling)

Test Rate 6 G.P.M. Duration of test hrs.

Drawdown ft. Date July 10

Static level-depth to water 5 ft.

Quality (clear, cloudy, taste, odor)

Pump installed by

WELL LOG*

Formations Sandstone, shale, limestone, gravel and clay	From	To
	0 Feet	35 Ft.
clay	35	5
shale	5	40
water at		
40 ft		

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.

N.

W.

[redacted]

S.

Drilling Firm Paul E mc Hill Date July 10 - 71

Address East Geneva, Pa. Signed Paul E mc Hill

*If additional space is needed to complete well log, use next consecutive numbered form.

Water Well 5

WELL LOG AND DRILLING REPORT

ORIGINAL

PLEASE USE PENCIL OR TYPEWRITER
DO NOT USE INK.

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus, Ohio 43212

No 374407

County Ashtabula Township Ashtabula Section of Township

Owner Larry Bucci Address [redacted]

Location of property [redacted]

CONSTRUCTION DETAILS

Casing diameter 8¼" I.D. Length of casing 19'
Type of screen Length of screen
Type of pump
Capacity of pump
Depth of pump setting
Date of completion 4-17-67

BAILING OR PUMPING TEST

Pumping Rate 4 G.P.M. Duration of test 1 hrs.
Drawdown 43 ft. Date 4-17-67
Static level-depth to water 8 ft.
Quality (clear, cloudy, taste, odor) clear, good
Pump installed by

WELL LOG*

Formations Sandstone, shale, limestone, gravel and clay	From	To
clay	0 Feet	11 Ft.
shale	11	51

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.

N

[redacted]

E.

S.

See reverse side for instructions

Drilling Firm HAROLD INMAN WELL DRILLING
Address RT. 2-JEFFERSON, OHIO

Date 12-29-67
Signed Harold Inman

*If additional space is needed to complete well log, use next consecutive numbered form.

Water Well 6

WELL LOG AND DRILLING REPORT

ORIGINAL

PLEASE USE PENCIL OR TYPEWRITER DO NOT USE INK.

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus 12, Ohio

No 295286

County Ashtabula Township Ashtabula Section of Township

Owner Walter Champlin Address [redacted]

Location of property [redacted]

CONSTRUCTION DETAILS

Casing diameter 6 O.D. Length of casing 61

Type of screen Length of screen

Type of pump

Capacity of pump

Depth of pump setting

Date of completion 5-16-63

BAILING OR PUMPING TEST

Pumping Rate 4 G.P.M. Duration of test hrs.

Drawdown 28 ft. Date 5-16-63

Static level-depth to water 47 ft.

Quality (clear, cloudy, taste, odor) good, clear

Pump installed by

WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
clay + sand	0 Feet	49 Ft.
gravel	49	52
clay	52	59
shale	59	75

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.

[redacted]

W.

S.

See reverse side for instructions

Drilling Firm HAROLD INMAN WELL DRILLING

Address RT. 2-JEFFERSON, OHIO

Date 12-11-63

Signed H. Inman

OHIO WATER SUPPLY BOARD

Well Record No. 450

Ashtabula Twp. Ashtabula Sec.

[redacted] Size 5 5/8"

Map Ashtabula

Owner J.W. Swayngim Address Ashtabula, Ohio

Driller Leo Inman Date 8/10/46

Well Head Elev. or M. P.

Elev. of Ground at Well

Pumping Test: Dry hole

Static Level Date

Normal Pumpage

Quality Use

Adequacy of supply

Owner's Well No. or Other Designation

Source of Data Inman

Collected by mt Date Oct. 1946

STRATA	DEPTH From	DEPTH To
Sand	0	30
Clay		60
Shale		102
Length of casing: 65 ft.		
X= 2,471,100		
Y= 820,300N		

* Chief Aquifer

GAS WELL LOGS

P.S.I:GRN,D,Cal.Gd.

OHIO DIVISION OF GEOLOGICAL SURVEY

Permit No. 852
Permit Issued 8-17-77

County ASHTABULA Township ASHTABULA Quadrangle Ashtabula No.
Section ____ Lot 7(W) Tract ____ Twp. Quarter ____
Measured 338' NL & 300' EL of Lot 7(W) Erie Tract, T-13R-3
20 Acres "Clinton" - Pool - R.T.

Land Owner New Jersey Zinc Co. Well No. 1 Date Commenced 10-2-77
Operator G&W Natural Resources Group Well No. ____ Date Completed 10-8-77
Elevation Bar 645'T 655'KB Total Depth 2960' Plugged Back ____
Formation Drld. To Ou Prod. Form. Cl Prod. Nat. ____
F/W 1905 bbls wtr., & 50M# sd. Pf. (15) 2725-2794 I.P. A.F.500MCFG
Init. Rock Press. ____ ____
Casing Record 8 5/8" 310', 4½" 2943' 150sks. Abandoned ____

Formation	Top	Bottom	Remarks	Formation	Top	Bottom	Remarks
Note: COMPLETION 3-9-78				X= 2,473,250 Y= 814,550			
Ohio shale	0	1433					
L. Lime	1433	1723					
Oriskany	1723	1762					
B. Lime	1762	2168					
Salina	2168	2297					
D. Lime	2297	2626					
Shale	2626	2690					
C. Shell	2690	2715					
Clinton	2715	2794					
Shale	2794	2960	TD				

Ohio Division Of Geological Survey

Permit No. 175
Permit Issued
Quadrangle
Twp. Quarter

County Ashtabula Township Ashtabula
Section Lot 7 Tract Erie
Measured

Land Owner Lawrence H. Lang Jr. Well No. 1 Date Commenced Old well?
Operator Cabot Corp/ Co. Well No. Date Completed
Elevation Bar S.L. Total Depth 700 Plugged Back
Formation Drld. To. Prod. Form. Prod. Nat.
I.P.
Init. Rock Press.
Casing Record 8 5/8"-unknown, 6¼"-145' Abandoned 9-27-62

Formation	Top	Bottom	Remarks	Formation	Top	Bottom	Remarks
no record							

Gas Well 175

TEST BORING DATA

MASON, SANDEFUR & de VERTEUIL, INC.
6035 Huntley Road Columbus, Ohio 43229 614/888-0576
Neil E. Mason, P.E. Walter E. Sandefur, P.E. Paul D. de Verteuil, P.E.

October 27, 1981

Burgess & Niple, Limited
5085 Reed Road
Columbus, Ohio 43220

Attention: Mr. Mark Rowland

Re: Boring Logs - Borings
Detrex Chemical Industries, Inc.
Ashtabula, Ohio
M S V Job No. 81-112

Gentlemen:

Relative to the reference borings, we respectfully submit information, as follows:

1. Legend - Boring Log Terminology
2. Boring Logs - Eleven Borings

Boring locations, and depths to which borings were sampled, were designated by others.

Borings were sampled continuously in sampling increments of 1.5 feet. Sampling primarily was by means of a 2-inch O.D.; 1 3/8-inch I.D. split-tube sampler, driven by a 140-pound hammer free-falling 30 inches with the number of blows determined for each six inches of penetration of the sampler. Normally, the standard penetration value is taken as the sum of blows required for driving the sampler the last 12 inches of the 18-inch sampling increment, with it being considered the sampler becomes properly seated in undisturbed soil during the first 6 inches of penetration of the 18-inch sampling increment.

Some undisturbed samples of materials penetrated were procured. Such are procured by hydraulically pressing, at a constant rate of advance, a 3 inch O.D. thinwall tube, with such causing minimum disturbance of the sample. In part, these were procured from the drive sample boring as the hole was advanced; in part, such were procured from a supplemental boring, immediately adjacent to the drive sample boring after its completion.

The boring logs have been prepared on the basis of the driller's field record of drilling and sampling and the soil engineer's examination and visual classification of the samples which were submitted to the laboratory by the driller. Stratification lines indicating changes in soil composition, moisture, and colors represent changes as best can be approximated by the driller, by sampling procedures and sample recovery, and by examination of samples. In situ, depths to changes may differ somewhat from those estimated from the above, or transitions may occur in a gradual manner and may not be sharply defined by a readily obvious line of demarcation.

All samples are being held until further instructions are received relative to testing desired or other disposition of the samples. Undisturbed samples are being stored in a sealed condition for possible future testing and have not been opened for classification.

Please discuss with us any questions you may have concerning the information presented.

Respectfully submitted,

MASON, SANDEFUR & de VERTEUIL, INC.

Neil E. Mason

Neil E. Mason, P.E.
Civil (Soil) Engineer, BCE., MSCE.

NEM:ja
Copies: Mr. Rowland - 4
File - 1

LEGEND - BORING LOG TERMINOLOGY

Explanation of each column, progressing from left to right.

1. Depth (in feet) - is distance below the ground surface.

2. Elevation (in feet) - is referenced to mean sea level, unless otherwise noted.

3. Penetration, Blows per 6"- the number of blows required to drive a 2-inch O.D., 1-3/8 inch I.D., split-spoon sampler, using a 140 pound hammer with a 30-inch free fall, recorded for 6-inch drive increments. Standard penetration resistance is based on total number of blows required for one-foot of penetration.

4. Length of sampler drive is indicated graphically by horizontal lines across the "Standard Penetration" and "Recovery" columns.

5. Recovery from each drive is indicated numerically, in the column headed "Recovery".

6. Drive sample location is designated by the heavy vertical bar in the "Sample No., Drive" column.

7. Length of hydraulically pressing "Undisturbed" sample is indicated graphically by horizontal lines across the "Press" column.

8. Sample numbers are designated consecutively, increasing with depth.

9. Description

   a. Moisture content is expressed relative to plastic properties:

Term	Relative Moisture or Appearance
Dry	Powdery
Damp	Moisture content slightly below plastic limit
Moist	Moisture content above plastic limit, but below liquid limit
Wet	Moisture content above liquid limit

   b. Texture is based on the Unified Classification System. Soil particle size definitions are as follows:

Description	Size	Description	Size
Boulders	Larger than 8"	Sand - Coarse	4.76 mm. to 2.00 mm.
Cobbles	8" to 3"	- Medium	2.00 mm. to 0.42 mm.
Gravel - Coarse	3" to 3/4"	- Fine	0.42 mm. to 0.074 mm.
- Fine	3/4" to 4.76 mm.	Silt	0.074 mm. to 0.005 mm.
		Clay	Smaller than 0.005 mm.

   c. Color - If a soil is uniform color throughout, the term is single, modified by such adjectives as light and dark. If the predominant color is shaded by a secondary color, the secondary color precedes the primary color separated by a hyphen. If two major and distinct colors are swirled throughout the soil, the colors are modified by the term "mottled".

10. Gradation - when tests are performed, the percentage of each particle size is listed in the indicated column (defined in item 9b.).

11. Moisture content is indicated graphically when test is performed for natural moisture content, liquid limit moisture content or plastic limit moisture content.

MASON, SANDEFUR & de VERTEUIL, INC. 6035 Huntley Road, Columbus, Ohio 43229, 614/888-0576

MASON, SANDEFUR & de VERTEUIL, INC. 6035 Huntley Road, Columbus, Ohio 43229, 614/888-0576

Client: BURGESS & NIPLE, LIMITED

Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO

M, S & V Job No. 81-112

BORING LOG

Boring No. 1

Location: Established by others

Date Drilled: 10 - 13 - 81

WATER OBSERVATIONS: Water seepage at: 7.5'-9.0' & 15.0'-16.5' (traces) 12.0'-13.5'
Water level at completion: 14.2'
Drilling Water level at completion:

STANDARD PENETRATION (N) Blows per foot — 10 20 30 40

MOISTURE CONTENT - % — PL Natural LL — 10 20 30 40

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay
0													
0.9		4 4 8	15	1		FILL — CLAY SILT to SILT CLAY, some Sand sizes, Trace of asphalt fragments, Brownish Gray mottled Brownish Yellow							
		9 12 11	12	2		Moist — Silty CLAY, some Sand sizes, trace Gravel sizes, Rusty Brown & Gray							
				3		Moist to Damp — CLAY SILT to SILT CLAY, Topsoil mixed, Mottled Rusty Yellow & Gray							
		12 14 18	18	4	1	Damp to Moist — SILT CLAY to SILTY CLAY, Trace of Sand sizes							
5		12 12 15	18	5		SILTY CLAY, Trace of Sand sizes, Grayish Brown to Mottled Yellow & Gray							
		12 14 15	12	6		Iron stained desiccation separations & cracks							
		7 9 12	18	7	2	Moist to Damp (Variable) — SILTY CLAY to SILT CLAY, Trace of Sand sizes, Brownish Gray to Slightly Brownish Gray							
10		18 16 12	18	8*		* Rock fragment in sample							
11.5		7 12 15	14	9									
		7 9 12	12	10		CLAY SILT to CLAYEY SILT, Trace of Sand sizes, Gray							
		4 6 9	14	11	3								
15		4 6 8	9	12									
16.5					Boring 1A	Bottom of Boring — 16.5'							

Note: Boring 1A for press samples
Press No. 1; 2.0'-3.5'; recovered 16 inches
Press No. 2; 8.0'-10.0'; recovered 23 inches
Press No. 3; 14.0-16.0'; recovered 19 inches

MASON, SANDEFUR & de VERTEUIL, INC. 6035 Huntley Road, Columbus, Ohio 43229, 614/888-0576

Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M,S&V 81-Job No. 112

BORING LOG | Boring No. 1A | Location: Established by others | Date Drilled: 11-10-81

WATER OBSERVATIONS: Water seepage at: | Water level at completion: 14.0' | Drilling Water level at completion:

STANDARD PENETRATION (N) Blows per foot — 10 20 30 40

MOISTURE CONTENT - % — PL Natural LL — 10 20 30 40

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay
0													
5						AUGERED TO 16.5'							
10													
15													
16.5		7 13 8	17	1		Clayey SILT to CLAY SILT, trace fine Sand	Gray, trace red specks						
18.2		4 5 11	12	2		Laminated CLAY and SILT, trace Sand							
		3 7 9	14	3	Moist	Laminated SILT and CLAY, trace Sand	Gray, trace red spots	1	0	2	7	41	49
22.5		5 6 9	17	4									
						Bottom of Boring — 22.5'							

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Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M, S & V Job No. 81-112

BORING LOG

Boring No. 2 | Location: Established by others | Date Drilled: 10-13-81

WATER OBSERVATIONS: Water seepage at: None; Water level at completion: None; Drilling Water level at completion:

STANDARD PENETRATION (N) Blows per foot — 10 20 30 40

MOISTURE CONTENT - % — PL, Natural, LL — 10 20 30 40

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay
0													
			*			* Augered 1.5 feet through gravel							
		10 10 12	16	1		Damp — SILTY CLAY to SILT CLAY, Trace to some Sand sizes — Rusty Yellow & Gray							
3.0						Bottom of Boring — 3.0'							

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Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M, S & V Job No. 81-112

BORING LOG

Boring No. 2A | Location: Established by others | Date Drilled: 11-10/11-81

WATER OBSERVATIONS: Water seepage at: 11.5', 15.0' | Water level at completion: 12.2' | Drilling Water level at completion:

STANDARD PENETRATION (N) Blows per foot: 10 20 30 40

MOISTURE CONTENT - %: PL Natural LL; 10 20 30 40

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay
0						AUGERED TO 30'							
3.0		5 7 9	18	1		Damp — CLAY SILT, trace to little Sand; trace shale fragments; trace Gravel	Brown & Gray with Red spots						
5		5 6 10	18	2		Damp to Moist	Brown						
7.7		6 7 9	18	3		Moist — Sandy CLAY SILT		2	3	5	10	51	29
		4 6 10	18	4		Clayey SILT,	Grayish Brown						
10		7 10 13	18	5		Damp to Moist — trace fine Sand							
11.5		10 10 11	12	6		CLAY SILT, little Sand, trace Gravel							
12.5		6 8 19	18	7		Sandy Clayey SILT, Shale fragments	Brown & Gray						
13.5		13 13 18	9	8		Damp — Clayey SILT (some laminations), Sand & Gravel seam							
15		5 8 11	14	9		Moist — Clayey SILT,	Gray						
		3 4 7	11	10		Very Moist to Wet — trace fine Sand							
		4 7 14	9	11		Wet — Clayey Fine Sandy SILT							
20		4 9 14	9	12		Very Moist to Wet — Clayey SILT, trace fine Sand, trace medium to coarse Sand	Gray trace Red spots						
	SOIL ANALYZED CONTINUED	5 11 11	14	13		Moist — Clayey SILT, trace fine Sand, some laminations of SILT & CLAY							
		3 8 13	12	14		CLAY SILT, little Sand	Gray with Red						
25		7 13	13	15		Damp — Sandy CLAY SILT, trace Gravel	Gray						

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Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M, S & V 81-Job No. 112

BORING LOG | Boring No. 2 A | Location: Established by others | Date Drilled: 11-10/11-81

WATER OBSERVATIONS: Water seepage at: 11.5', 15.0' | Water level at completion: 12.2' | Drilling Water level at completion:

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay
25													
25.5		23				Damp Sandy CLAY SILT, trace Gravel Gray							

Bottom of Boring – 25.5'

STANDARD PENETRATION (N) Blows per foot: 0 | 10 | 20 | 30 | 40

MOISTURE CONTENT - % PL x — Natural ● — LL x : 10 | 20 | 30 | 40

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Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M,S&V 81-Job No. 112

BORING LOG | Boring No. 3 | Location: Established by others | Date Drilled: 10-13-81

WATER OBSERVATIONS: Water seepage at: None; Water level at completion: None; Drilling Water level at completion:

STANDARD PENETRATION (N) Blows per foot

MOISTURE CONTENT - % PL Natural LL

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS		DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay
0														
		0 3 4	12	1		Damp to Moist	SILTY CLAY to CLAY SILT Trace of sand sizes — Dark Grey & Brown							
		3 7 12	16	2		Damp	SILTY CLAY to SILT CLAY Trace to some Sand sizes — Mottled Rusty Yellow & Grey							
		7 9 10	12	3		Damp	SILTY CLAY changing to CLAY SILT to CLAYEY SILT Trace of sand sizes — Mottled Yellow & Grey							
5		6 9 10	14	4		Damp to Moist	Like Sample 3							
		Pass 18"	1T		1									
7.5							Bottom of Boring - 7.5'							

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Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC ASHTABULA, OHIO | M.S&V Job No. 81-112

BORING LOG

Boring No. 3A | Location: Established by others | Date Drilled: 11-10-81

WATER OBSERVATIONS: Water seepage at: 10.5'-12.0' (trace) 16.7-16.9' (slight)
Water level at completion: None
Drilling Water level at completion:

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	% Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay	STANDARD PENETRATION (N) Blows per foot	MOISTURE CONTENT - %
0						AUGERED TO 7.5'									
7.5		4 7 11	16	1		Moist — Clayey SILT, trace fine Sand	Grayish Brown								PL — Natural — LL
9.0		5 7 13	15	2		Damp — CLAY SILT, trace to little Sand, trace Gravel	Brownish Gray								
10.5		4 6 9	12	3		CLAY SILT, some laminations of Silt and Clay	Gray with Red streaks								
		3 3 5	14	4		SILT CLAY, trace Sand	Gray with Red								
		3 6 10	12	5		Moist — CLAY SILT, trace fine Sand, some laminations of Silt and Clay	Gray								
15		7 10 11	13	6		Clayey SILT, trace fine Sand	Gray with Red								
16.9		7 9 12	12	7		Laminated CLAY and SILT, trace fine Sand									
18.0	SOILS ARE CONTINUATION OF ABOVE.	7 15 24	13	8		Approximate Change									
		13 15 18	14	9		Damp — Clayey SILT, little Sand	Gray	1	3	4	7	53	32		
20 21.0						Bottom of Boring - 21.0'									

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Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M.S&V 81-112 Job No.

BORING LOG

Boring No. 4 | Location: Established by others | Date Drilled: 10-13-81

WATER OBSERVATIONS: Water seepage at: 8.0', 8.6' (traces)
Water level at completion: 1.0' after 6 hours
Drilling Water level at completion:

STANDARD PENETRATION (N) Blows per foot: 10 20 30 40

MOISTURE CONTENT - % PL Natural LL: 10 20 30 40

GRADATION: % Agg. | % C.S. | % M.S. | % F.S. | % Silt | % Clay

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification
0							
0.4'		0 1 6	10	1 2		Moist Topsoil Sandy, SILTY CLAY to CLAY SILT Sandy — Dark Gray Mottled Rusty Yellow & Gray	
						Moist to Damp SILTY CLAY to SILT CLAY	
		4 8 16	13	3		SILTY CLAY to SILT CLAY	
		4 8 12	16	4		Damp Trace to some Sand sizes — Brownish Gray	
5		8 12 12	10	5			
		Auger 24"	24		1		
		9 15	7	6		Damp to Moist * SILTY CLAY to SILT CLAY Trace to some Sand sizes with thin (≤ 1/4") silt streaks or seams — Brownish Gray to Gray	
10		7 9 17	12	7			
10.5						Bottom of Boring — 10.5'	

* NOTE: Driller reports a brown fine sandy silt seam 9.0 - 9.8'

MASON, SANDEFUR & de VERTEUIL, INC. 6035 Huntley Road, Columbus, Ohio 43229, 614/888-0576

Client: BURGESS & NIPLE, LIMITED | Project: DETREY CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M,S&V 81-112 Job No.

BORING LOG | Boring No. 4A | Location: Established by others | Date Drilled: 11-10-81

WATER OBSERVATIONS: Water seepage at: 10.5' - 12.0' (trace)
Water level at completion: None
Drilling Water level at completion:

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay
0													
						AUGERED TO 10.5'							
10													
10.5		5 7 10	13	1		SILT CLAY, trace to little Sand — Gray							
		3 5 6	18	2		Moist SILT CLAY, some laminations of CLAY and SILT — Gray							
		6 8 9	14	3		trace Sand — Gray with Red		0	0	1	3	55	41
15.0						Bottom of Boring - 15.0'							

STANDARD PENETRATION (N) Blows per foot: 10 20 30 40

MOISTURE CONTENT - % PL Natural LL: 10 20 30 40

MASON, SANDEFUR & de VERTEUIL, INC. 6035 Huntley Road, Columbus, Ohio 43229, 614/888-0576

Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M, S & V Job No. 81-112

BORING LOG

Boring No. 5 | Location: Established by others | Date Drilled: 10-13-81

WATER OBSERVATIONS: Water seepage at: None; Water level at completion: None; Drilling Water level at completion:

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	% Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay
0													
0.7		0 2 3	7	1		Moist Topsoil Sandy, CLAY SILT & CLAYEY SILT — Gray							
						Moist — Sandy CLAYEY SILT changing to — Mottled Yellow and Gray							
		4 6 9	13	2		to Damp SILTY CLAY with trace of sand sizes							
		5 7 10	12	3		Moist to Damp — SILTY CLAY to SILT CLAY Trace to some sand sizes Some Clayey Silt streaks — Mottled Yellow & Gray							
4.5						Bottom of Boring — 4.5'							

STANDARD PENETRATION (N) Blows per foot: 10 20 30 40

MOISTURE CONTENT - %: PL — Natural — LL; 10 20 30 40

MASON, SANDEFUR & de VERTEUIL, INC. 8035 Huntley Road, Columbus, Ohio [illegible] 614 [illegible]

Client: BURGESS & NIPLE, LIMITED

Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO

M, S & V Job No. 81-112

BORING LOG

Boring No. 5A **Location:** Established by others **Date Drilled:** 11-10-81

WATER OBSERVATIONS:
Water seepage at: 3.5, traces @ 6.0'-6.4', 11.0'-11.2', 12.0'
Water level at completion: 12.0'
Drilling Water level at completion:

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	% Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay	STANDARD PENETRATION (N) Blows per foot / MOISTURE CONTENT - % (PL, Natural, LL)
0 – 4.5						AUGERED TO 4.5'								
4.5 – 5		3, 7, 9	18	1		Very Moist to Wet; Clayey SILT, trace Sand; Grayish Brown								
5 – 7.5		7, 16, 23	10	2		Clayey SILT, some laminations of SILT and CLAY; Grayish Brown								
7.5		9, 9, 9	16	3		Damp; CLAY SILT, trace Sand; Gray								
10	SOILS ANALYZED = CONTAMINATED (10 – 16.5)	6, 7, 12	11	4		Damp; SILT CLAY, trace Sand, some laminations of CLAY and SILT; Gray		0	0	0	0	60	40	X—X (PL–LL, approx. 10–30)
		3, 9, 11	11	5		Moist; CLAY SILT, little fine Sand, some laminations of SILT and CLAY; Gray								
		3, 6, 9	12	6		Very Moist; CLAY SILT, little fine Sand, some laminations of SILT and CLAY; Gray								
15		3, 5, 9	14	7		Moist; SILT CLAY, little Sand, fine Sand streaks; Gray								
15.2 – 16.5		3, 5, 18	10	8		Damp; Sandy CLAY SILT, trace Gravel; Gray								

Bottom of Boring – 16.5'

MASON, SANDEFUR & de VERTEUIL, INC. 6035 Huntley Road, Columbus, Ohio 43229, 614/888-0576

Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M, S & V 81-Job No. 112

BORING LOG | Boring No. 6 | Location: Established by others | Date Drilled: 10-13-81

WATER OBSERVATIONS: Water seepage at: None; Water level at completion: None; Drilling Water level at completion:

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay	STANDARD PENETRATION (N) Blows per foot	MOISTURE CONTENT - % PL Natural LL
0														10 20 30 40	10 20 30 40
		1 3 7	15	1		Damp — SILTY CLAY Some Sand sizes, Gravel sizes, and Shale fragments — Dark Gray to Rusty Yellow and gray									
		5 9 11	14	2		Damp — SILTY CLAY Trace of Sand sizes and Shale particles — Mottled Rusty Yellow and Gray									
		6 8 10	18	3		Moist — SILTY CLAY to SILT CLAY Trace of Sand sizes — Rust. stained partings — Brownish Gray									
4.5						Bottom of Boring — 4.5'									

MASON, SANDEFUR & de VERTEUIL, INC. 6035 Huntley Road, Columbus, Ohio 43229, 614/888-0576

Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M, S & V 81-112 Job No.

BORING LOG | Boring No. 6A | Location: Established by others | Date Drilled: 11-10-81

WATER OBSERVATIONS: Water seepage at: 9.6' - 10.5' | Water level at completion: 10.0' | Drilling Water level at completion:

STANDARD PENETRATION (N) Blows per foot — 0 | 10 | 20 | 30 | 40

MOISTURE CONTENT - % — PL | Natural | LL — 10 | 20 | 30 | 40

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay
0						AUGERED TO 4.5'							
4.5													
5		4 5 9	18	1		Moist — Sandy, CLAY SILT, trace Gravel — Brown							
		3 6 13	12	2									
		4 10 14	11	3		Damp — SILT CLAY, little Sand, fine Sand streaks — Grayish Brown							
9.1													
10		7 13 11	13	4		Wet — Slightly Clayey SILT, trace fine Sand							
		2 3 5	16	5		Very Moist — Clayey SILT, fine Sand streaks — Gray		1	0	0	1	62	36
12.0						Approximate Change							
		3 3 7	13	6		SILT CLAY, trace Sand							
		4 6 9	15	7		CLAY SILT, trace Sand — Gray with Red streaks							
15		4 6 7	14	8		Moist — CLAY SILT, fine Sand streaks							
16.5													
		4 4 8	11	9		Sandy, CLAY SILT, trace Gravel — Gray with Red							
		4 7 10	14	10		Damp to Moist							
20		5 9 13	11	11		Moist — CLAY SILT, little Sand, trace Gravel — Gray							
21.0						Bottom of Boring - 21.0'							

MASON, SANDEFUR & de VERTEUIL, INC. 6035 Huntley Road, Columbus, Ohio 43229, 614/888-0576

Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M, S & V 81-112 Job No.

BORING LOG

Boring No. 7 | Location: Established by others | Date Drilled: 10-12/13-81

Water seepage at: None
Water level at completion: 8.3'
Drilling Water level at completion:

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay	STANDARD PENETRATION (N) Blows per foot	MOISTURE CONTENT - % PL Natural LL
0															
0.4		3 3 8	14	1		Moist — Clayey to silty SAND & GRAVEL — Dark Gray									
				2		SILTY CLAY with trace to some Sand sizes — Mottled Yellow and Gray changing to Brownish Gray									
		7 9 12	17			Damp									
3.0				3											
		11 12 16	18	4		SILTY CLAY to SILT CLAY — Some Sand sizes — Possibly slightly more silty — Desiccated Separations & cracks all dark rusty brown stained — Grayish Brown									
5		6 18 22	17	5		Damp									
		21 28 35	18	6											
		8 20 25	18	7		Damp to Moist — SILT CLAY to CLAY SILT — Some Sand sizes									
9.1		8 15 20	15	8		Damp — SILTY CLAY to SILT CLAY — Some Sand sizes — Gray									
10															
10.5						Bottom of Boring — 10.5'									

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Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M, S & V Job No. 81-112

BORING LOG

Boring No. 7A | Location: Established by others | Date Drilled: 11-9-81

WATER OBSERVATIONS: Water seepage at: | Water level at completion: 9.7' | Drilling Water level at completion:

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay	STANDARD PENETRATION (N) Blows per foot	MOISTURE CONTENT - % PL / Natural / LL
0						AUGERED TO 10.5'								10 20 30 40	PL Natural LL 10 20 30 40
10 / 10.5		10 16 17	18	1		Damp — Sandy, Clayey, Silt, trace Gravel — Gray		2	2	5	12	50	29		
		9 13 14	13	2											
15.0		8 11 15	18	3											
						Bottom of Boring — 15.0'									

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Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. | M, S & V Job No. 81-112

BORING LOG

Boring No. 8 | Location: Established by others | Date Drilled: 10-13-81

WATER OBSERVATIONS: Water seepage at: None; Water level at completion: None; Drilling Water level at completion:

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay	STANDARD PENETRATION (N) Blows per foot	MOISTURE CONTENT - % PL / Natural / LL
0															
0.6		0 2 3	12	1		Moist — 7" Topsoil CLAYEY SILT changing to SILTY CLAY Trace to some Sand sizes — Rusty Yellow and Gray									
		6 8 12	0												
		Pushed 18"	7.5		1										
5		6 7 12	15	2		Damp — CLAY SILT to CLAYEY SILT with trace to some Sand sizes — Rust stained Brownish Gray									
		11 13 17	1	3											
		6 7 9	14	4		Moist — Like Sample 2 — Gray									
9.0						Bottom of Boring — 9.0'									

MASON, SANDEFUR & de VERTEUIL, INC. 6035 Huntley Road, Columbus, Ohio 43229, 614/888-0576

Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M, S & V Job No. 81-112

BORING LOG | Boring No. 8A | Location: Established by others | Date Drilled: 11-9-81

WATER OBSERVATIONS: Water seepage at: 12.5' Water level at completion: 12.0' Drilling Water level at completion:

STANDARD PENETRATION (N) Blows per foot: 10 20 30 40

MOISTURE CONTENT - %: PL Natural LL; 10 20 30 40

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay
0						AUGERED TO 9.0'							
9.0													
10		3 6 8	14	1		Moist — Clayey SILT, little fine Sand	Gray						
		4 6 12	13	2		Very Moist — Slightly Clayey SILT,							
		3 9 13	11	3		Damp to Moist — trace fine Sand							
14.4		7 11 7	12	4		SILT CLAY, trace Sand, some laminations of CLAY and SILT — Approximate change	Gray with Red						
15.0		2 4 7	16	5		Moist — Sandy,	Gray						
		3 7 8	17	6		CLAY SILT,		5	2	4	4	45	40
		8 11 13	18	7		Damp — trace Gravel							
19.5						Bottom of Boring - 19.5'							

MASON, SANDEFUR & de VERTEUIL, INC. 6035 Huntley Road, Columbus, Ohio 43229, 614/888-0578

Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M, S & V Job No. 81-112

BORING LOG

Boring No. 10 | Location: Established by others | Date Drilled: 10-12/13-81

WATER OBSERVATIONS: Water seepage at: 5.4' (slight), 13.0' | Water level at completion: | Drilling Water level at completion:

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay	STANDARD PENETRATION (N) Blows per foot 10 20 30 40	MOISTURE CONTENT - % PL Natural LL 10 20 30 40
0															
0.9'		1 3 6	15	1		Topsoil									
				2		Moist Clayey SAND & GRAVEL changing to Sandy CLAYEY SILT Dark Brown									
		9 12 12	2			Sandy	Dark								
		4 6 8	16	3 4		Damp SILTY CLAY containing trace of Gravel sizes — containing Rusty yellow Silt and Silty Sand streaks and seams	Gray to Gray								
5		6 8 7	10	5		Sandy CLAY SILT to SILT CLAY & SILTY CLAY trace of coarser sizes and shale fragments — Trace of Natural Organic Contamination *	Gray to Brownish Gray								
		5 6 7	12	6											
		2 3 5	6	7		Moist									
10		0 1 3	10	8		SILT CLAY to SILTY CLAY Various degrees of natural organic to contamination * Trace of Sand sizes — Desiccation cracks	Brownish Gray to Gray								
		1 3 5	2	9											
		1 1 4	2	10		Moist Clayey FINE SAND containing fragments of partially decomposed wood	Gray								
12.5		0 2 30	10	11											
15		16 38 32	12	12		Damp to Dry Sandy SILTY CLAY to SILT CLAY with Shale fragments and some fine gravel sizes	Gray								
		10 24 40	14	13		Damp									
		19 25 28	16	14											
19.5						Bottom of Boring - 19.5'									

* Refers to presence of wood, root fibers, etc.

MASON, SANDEFUR & de VERTEUIL, INC. 6035 Huntley Road, Columbus, Ohio 43229, 614/888-0576

Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M,S&V Job No. 81-112

BORING LOG | Boring No. 10A | Location: Established by others | Date Drilled: 11-9-81

WATER OBSERVATIONS: Water seepage at: | Water level at completion: 12.5' | Drilling Water level at completion:

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay	STANDARD PENETRATION (N) Blows per foot (10 20 30 40) / MOISTURE CONTENT - % PL Natural LL (10 20 30 40)
0														
5						AUGERED								
10						TO								
15						19.5'								
19.5														
20		10 19 22	16	1		Sandy								
		4 12 21	13	2		Damp CLAY SILT, Gray								
		9 14 22	12	3		trace Gravel		7	15	6	8	31	33	
24.0						Bottom of Boring - 24.0'								

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Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M, S & V Job No. 81-112

BORING LOG

Boring No. 11 | Location: Established by others | Date Drilled: 10-12/13-81

Water seepage at: 3.0'-4.5' (trace)
WATER OBSERVATIONS: Water level at completion: 0.7'
Drilling Water level at completion:

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay	STANDARD PENETRATION (N) Blows per foot	MOISTURE CONTENT - % PL / Natural / LL
0															
0.3		9 8 7	16	1		Moist Sandy CLAYEY SILT to Clayey SANDY SILT w Gravel Gray & Brown									
				2		Damp Very Sandy CLAYEY SILT Rusty Yellow & Gray									
		12 14 16	15	3		Damp to Moist SILTY CLAY Some Sand sizes Dark brown root stained desiccation crack/separations & Gray Rusty Brown									
		7 9 12	18	4		Moist CLAY SILT to SILT CLAY with Silt streaks & inclusions Sandy Rusty Yellow & Gray									
5		6 10 20	12	5		Moist to Saturated Clayey SILT Trace of Sand sizes Brown									
7.1		9 10 12	16	6		— Some thin silt streaks —									
		5 7 10	14	7		Laminated									
10		5 7 12	15	8		Moist SILTY CLAY Gray									
		7 9 14	14	9		trace of Sand sizes and Shale particles									
		9 12 14	14	10											
		5 10 12	12	11		Lamination not as evident									
15.0															

Bottom of Boring — 15.0'

10-12-81 Boring advanced to 6.0'

10-13-81 At start of work, waterlevel was at 0.5'; boring continued.

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Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M, S & V 81-Job No. 112

BORING LOG | Boring No. 11A | Location: Established by others | Date Drilled: 11-9-81

WATER OBSERVATIONS: Water seepage at: | Water level at completion: 1.0' | Drilling Water level at completion:

STANDARD PENETRATION (N) Blows per foot — 10 20 30 40

MOISTURE CONTENT - % — PL Natural LL — 10 20 30 40

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay
0													
						AUGERED							
5						TO							
10						15.0'							
15.0'		4 12 16	12	1		Damp — Sandy,							
		4 7 12	11	2		Moist — CLAY SILT,	Gray	9	15	5	6	34	31
		4 12 15	14	3		Damp to Moist — trace Gravel							
19.5						Bottom of BORING – 19.5'							

MASON, SANDEFUR & de VERTEUIL, INC. 6035 Huntley Road, Columbus, Ohio 43229, 614/888-0576

Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M,S&V 81-Job No. 112

BORING LOG

Boring No. 12 | Location: Established by others | Date Drilled: 10-13-81

WATER OBSERVATIONS: Water seepage at: 2.5' | Water level at completion: None | Drilling Water level at completion:

STANDARD PENETRATION (N) Blows per foot: 10 20 30 40

MOISTURE CONTENT - % PL Natural LL: 10 20 30 40

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay
0													
0.5		3 5 9	16	1		Moist Sandy CLAYEY SILT, Some Gravel sizes Dark Gray to Brown							
				2		Moist Sandy CLAYEY SILT Some Gravel sizes Brown							
		4 7 9	3	3		Mottled Rusty Yellow & Gray							
		4 5 6	18	4		Moist SILTY CLAY Trace to some Sand sizes Laminated Some Fine Sand seams							
5		3 4 10	16	5		Brownish Gray							
		12 16 18	18	6		Damp Gravel in sample Desiccated							
		14 20 22	18	7									
10		9 9 9	9	8		Sandy Gray							
		5 9 12	14	9		Damp CLAY SILT to SILT CLAY Some Fine Gravel sizes							
		6 9 15	16	10									
13.5						Bottom of Boring — 13.5'							

MASON, SANDEFUR & de VERTEUIL, INC. 6035 Huntley Road, Columbus, Ohio 43229, 614/888-0576

Client: BURGESS & NIPLE, LIMITED | Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO | M.S&V 81-112 Job No.

BORING LOG

Boring No. 12A | Location: Established by others | Date Drilled: 11-9-81

WATER OBSERVATIONS: Water seepage at: | Water level at completion: None | Drilling Water level at completion:

STANDARD PENETRATION (N) Blows per foot — 10 20 30 40

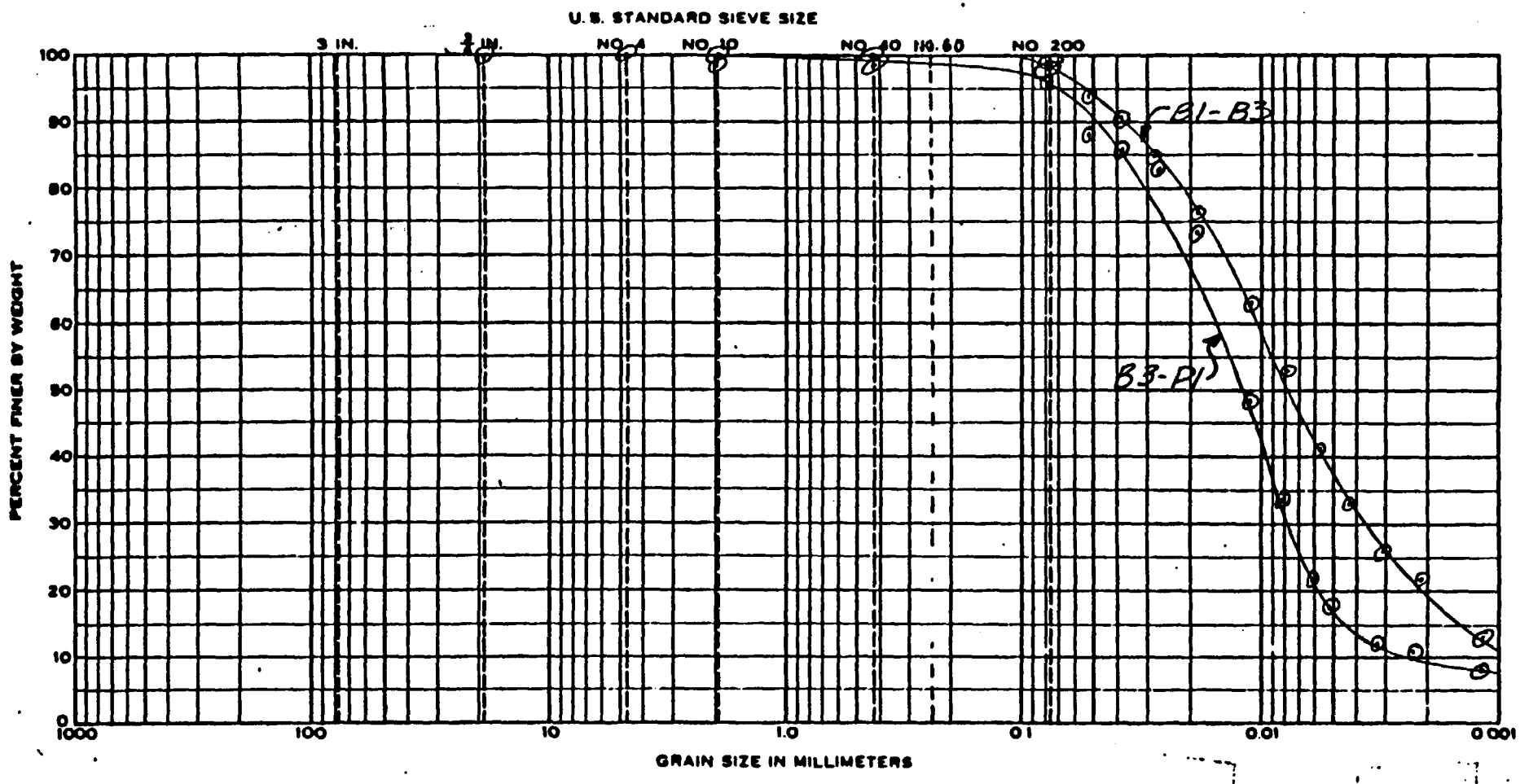
MOISTURE CONTENT - % — PL Natural LL — 10 20 30 40

DEPTH in feet	ELEVATION in feet	PENETRATION Blows per 6"	RECOVERY in inches	SAMPLE NO. DRIVE	SAMPLE NO. PRESS	DESCRIPTION	Soil Classification	GRADATION % Agg.	% C.S.	% M.S.	% F.S.	% Silt	% Clay
0													
						AUGERED							
5						TO							
10						13.5'							
13.5													
		5 11 12	10	1		Sandy CLAY SILT, little Gravel, Shale fragments							
15		7 11 14	16	2		Damp Sandy Clayey SILT, Gray							
		7 12 16	15	3		trace Gravel		2	7	8	10	45	28
18.0						Bottom of Boring — 18.0'							

MASON, SANDEFUR & de VERTEUIL, INC. 6035 Huntley Road, Columbus, Ohio 43229, 614/888-0578

Client: BURGESS & NIPLE, LIMITED	Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO	M,S&V Job No. 81-112

GRADATION CURVES

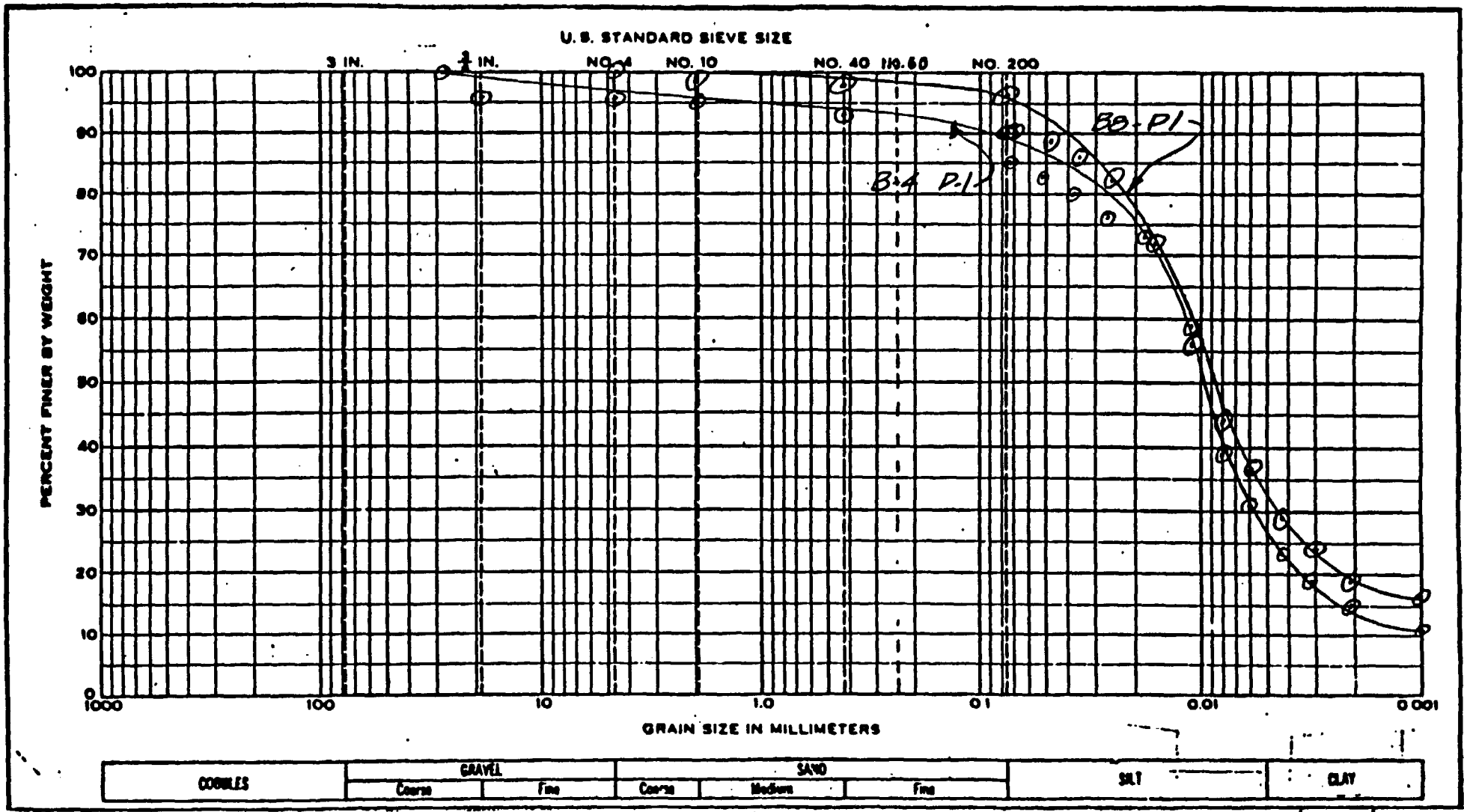


Boring No.	Ground Surface Elevation	Sample No. Drive	Sample No. Press	Depth from (ft.)	Depth to (ft.)	Water Content (%)	Gradation Agg (%)	C.S (%)	M.S (%)	F.S. (%)	Silt (%)	Clay (%)	Plasticity LL (%)	PL (%)	PI (%)	Initial Void Ratio e_o	Coefficient of Permeability k (cm/sec)
1			P3	14.3	14.5	21.9	0	0	0	1	62	37	27	21	6	0.64	9×10^{-8}
3			P1	6.2	6.4	28.7	0	1	0	1	81	17	30	25	5	0.712	2×10^{-6}

MASON, SANDEFUR & de VERTEUIL, INC. 6035 Huntley Road, Columbus, Ohio 43229, 614/888-0578

Client: BURGESS & NIPLE, LIMITED	Project: DETREX CHEMICAL INDUSTRIES, INC. ASHTABULA, OHIO	M, S & V Job No. 81-112

GRADATION CURVES



Boring No.	Ground Surface Elevation	Sample No. Drive	Sample No. Press	Depth from (ft.)	Depth to (ft.)	Water Content (%)	Gradation Agg (%)	C.S. (%)	M.S. (%)	F.S. (%)	Silt (%)	Clay (%)	Plasticity LL (%)	PL (%)	PI (%)	Initial Void Ratio e_o	Coefficient of Permeability k (cm/sec)
4			1	6.0	6.5	20.8	4	1	2	3	63	27	29	21	8	0.571	2×10^{-7}
8			1	3.0	3.4	22.0	0	1	1	2	63	33	31	22	9	0.639	9×10^{-8}

45

Detrex Muriatic Acid Plant
Ashtabula, Ohio

NOV 21 1975

Nov. 19, 1975

A. R. Winklhofer
Director, NCDO

19-5L46-0/00109

D. Bryson
Attn: D. Hatfield

As requested by the Enforcement Division, the Detrex Chemical Industries' Muriatic Acid Plant in Ashtabula, Ohio was visited on October 15, 1975 for the purposes of inspecting several waste lagoons and obtaining a grab sample of Outfall 002. The results of the inspection follow, while the analytical results of the outfall sample will be forwarded as soon as they are available from CRL. Preliminary results show the sample to be highly contaminated with chlorinated compounds, but only tetrachloroethylene has been identified to date. If you have any questions regarding the following information please contact Mr. Michael Bennett of my staff.

The Detrex Muriatic Acid Plant, formerly the Chlorinated Solvents Plant, has used six lagoons for disposal of waste from the chlorinated solvents processes during its operation. The location and a number for each is given in Figure 1. The disposal sites were constructed in sets of two as they were needed, and then abandoned as they became filled with waste. Only two lagoons were used at any one time - beginning with use of Lagoons #1 and #2, followed by Lagoons #3 and #4, and then Lagoons #5 and #6. According to Mr. Arnold Freede, Plant Supervisor, Lagoons #1, #2, #3 and #4 were abandoned sometime before he began working at the plant in 1953, while Lagoons #5 and #6 were abandoned in April 1972, after the chlorinated solvents operation had been shut down. Sometime in the past, two of the basins, Lagoons #1 and #4, were buried with what appeared to be a type of clay. Presently, three of the remaining four lagoons contain large volumes of liquid, while the fourth lagoon (#3) has a small volume. This statement should be noted as a correction to a previous statement made in the Compliance Monitoring Field Report memo of September 15, 1975, which indicated the lagoons had a low liquid level. The lagoons are located behind the plant on slightly elevated ground. The site is littered with debris including 55 gallon barrels and chemical canisters. Around the perimeter of the basins the land slopes toward Outfall 001 which flows directly to Fields Brook (Figure 1). A leak in any one of the lagoons would discharge waste that could eventually reach the stream. The structures are eroding and apparently not maintained, increasing the chances of a large discharge of waste material. Below is a brief description of the lagoons and the major problems noticed with each. In addition, there are 18 photographs attached which are coordinated with Figure 2 to illustrate the points.

Lagoon #1 is one of the two ponds which have been filled with clay, and subsequently contains no liquid waste material which could escape. It does, however, present a probable discharge path for waste from Lagoon #3 to Outfall 001 (Photos 1, 2, &3). Waste could initially escape from Lagoon #3 at a break in its east wall (Photo 1 - Red Arrow) which opens directly to Lagoon #1 (Photo 1 - Black Arrow). From that point, the liquid would flow over the low lying, sloping, surface of Lagoon #1 (Photos 1 and 2) toward a gully at the opposite end (Photo 3 - Blue Arrow). Once inside the gully, the waste would flow into the outfall discharge ditch and on to Fields Brook.

Lagoon #3 is about 75 feet square and very shallow. It is surrounded by a dike on the west, north, and east sides, except for the break noted above. The south side has no dike and consequently has a high waterline (Photos 4 and 5). The land to the south of the lagoon (Photos 4, 5, &6) gently slopes toward the ditch along the nearby railroad tracks. Photograph 6 was taken while the photographer was standing in the ditch and shows the overall change in land elevation. As noted in Figure 1, the ditch is connected to the discharge channel to Fields Brook. With these topographical characteristics, it is possible that Lagoon #3 could overflow during periods of precipitation and eventually reach Fields Brook.

Lagoon #2 is about 100 feet square and apparently quite deep. It is surrounded by a dike with adequate freeboard, except in the southeast corner where the lagoon has a very high waterline (Photo 9). The lack of freeboard at this point could allow an overflow during periods of precipitation. As shown in Photographs 7, 8, and 9, an overflow would follow the slope of the land toward the railroad tracks to the east (Figure 1 - North Tracks). From there, waste would follow the depression of land along the tracks which slopes toward the ditch along another track to the south (Figure 1 - South Track). After reaching the ditch, waste would continue to flow to Fields Brook.

Lagoon #5 is about 150 feet long by 75 feet wide and apparently quite deep. It is surrounded by a dike which is deteriorating due to erosion and an apparent lack of maintenance. A significant problem area exists at the northwest corner where a hole in the dike could allow waste material to escape (Photos 10, 11, & 12). At that point, the dike provides very little freeboard and the waterline is quite high - almost to the point of overflowing (Photos 10 & 12). Any amount of precipitation would probably cause the lagoon to overflow. If a leak occurred, the liquid would follow the slope of the land to the east, and then south behind the lagoons toward the ditch along the railroad tracks (Figure 1 - South Track). Such a topography could eventually allow overflowed waste to reach Fields Brook.

Lagoon #6 is about 100 feet long by 75 feet wide, and, according to Mr. Arnold Freede, about 15 feet deep. The depth reportedly resulted from a dredging by Koski Construction Company of Ashtabula, Ohio, sometime after it was abandoned in 1972. Although sludge materials have been

removed, the remaining liquid waste may be contaminated as indicated by its very dark color. Lying in and around the lagoon are a number of discarded 55 gallon barrels.

The major problems with this lagoon were two leaks on the north side (Photos 15 & 16) and a lack of dike freeboard around its perimeter (Photos 13, 14, & 17). At the two leaks, liquid was flowing at a very slow rate down the sloping north side of the lagoon to a pond of water (Photos 15, 16, & 18). The pond was most likely largely the result of precipitation, but it is also possible that it resulted from an overflow of the lagoons during precipitation. Lagoon #6 could easily overflow because of the already established leaks, and the high waterline at several other points (a lack of freeboard). Overflowed material would either flow east along Lagoons #5, #4, and #2, and then south (in a manner similar to wastes escaping from Lagoon #5), or west along the depression of land near the railroad tracks. Wastes flowing to the west could possibly reach Fields Brook via Outfall 002 by seeping into the ground and entering the discharge pipe (Figure 1).

Since the lagoons are no longer used by Detrex it is recommended that they be cleaned out, lined with clay to prevent seepage, and then filled with appropriate material. The ground should then be returned to its normal contour and possibly planted with rough grasses. Furthermore, the 002 Outfall should be cemented shut as the low volume discharge from this outfall has been shown to contain chlorinated organics on several occasions.

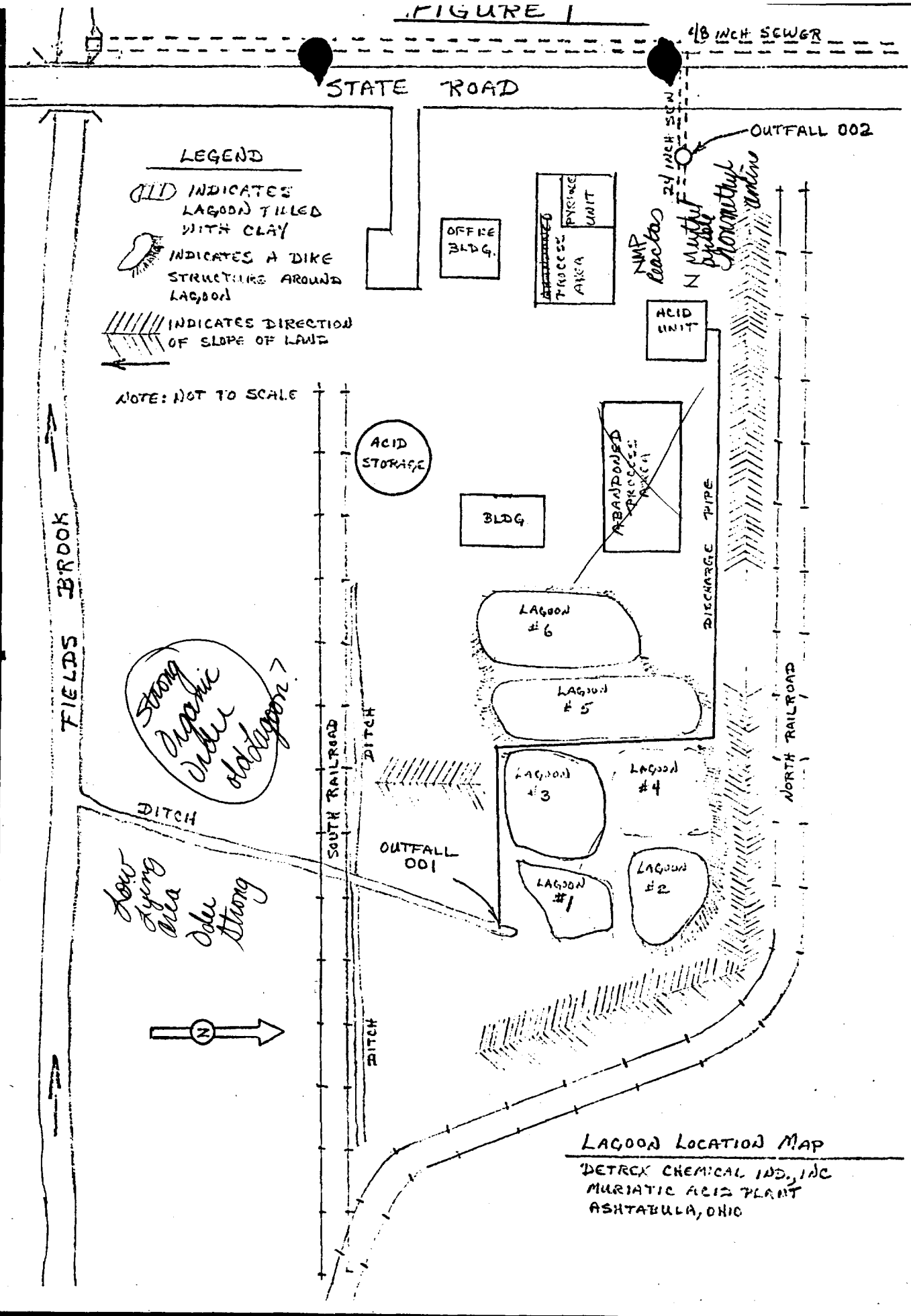
Attachments

cc: D. Seeds
OEPA-NEDO

J. Evans,
OEPA-Columbus

MBennett:arw

FIGURE 1

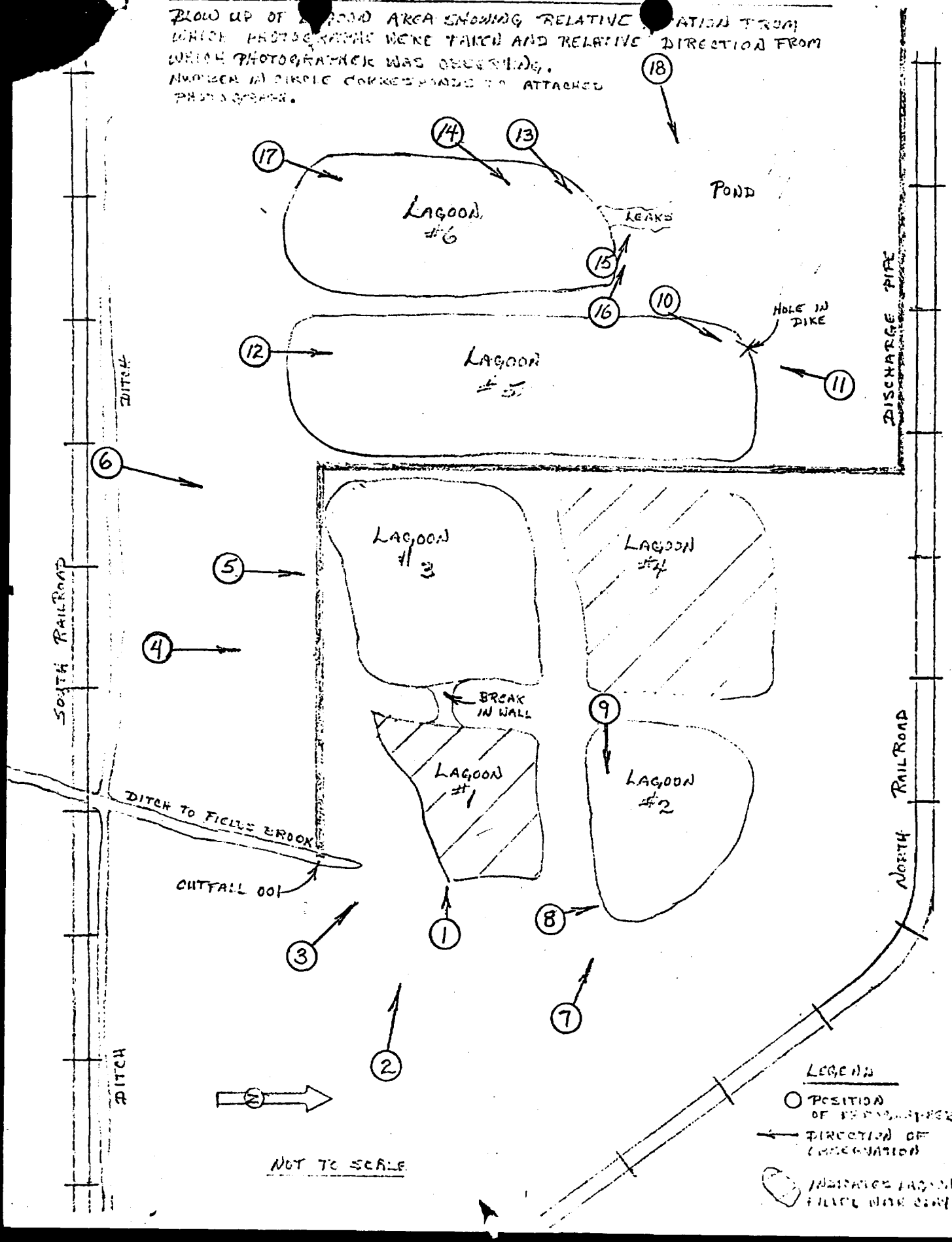


LAGOON LOCATION MAP

DETREX CHEMICAL IND., INC
MURIATIC ACID PLANT
ASHTABULA, OHIO

FIGURE 2

BLOW UP OF [illegible] AREA SHOWING RELATIVE [illegible]ATION FROM WHICH PHOTOGRAPHS WERE TAKEN AND RELATIVE DIRECTION FROM WHICH PHOTOGRAPHER WAS FACING. NUMBER IN CIRCLE CORRESPONDS TO ATTACHED PHOTOGRAPH.



1

Photograph of Lagoon #[redacted] which is the dry, light gray area just below the blue water. The water is from Lagoon #3 and picture shows how a break in the dike around Lagoon #3 would allow water to overflow into Lagoon #1. The land in this picture gently slopes from Lagoon #3 to the bottom of the picture. (See PHOTOS 2+3). Black Arrow shows Lagoon #1 - Red Arrow shows Lagoon #3.

1 / PHOTOGRAPHER FACING WEST.

2 Photographer Facing West.
Long shot of Lagoon #1 (Black Arrow) showing general slope of land toward Outfall 001 (Blue Arrow). Lagoon #3 (Red Arrow) can be seen in background.

See PHOTOS #1 + #3.

2

3

Photographer Facing Northwest.
Photo of Lagoon #1 (Black Arrow) and Outfall 001 (Red Arrow) showing the trench or gully between the two (Blue Arrow).

See PHOTOS #1 + #2.

3

4 Photographer Facing North.
Photo of the south bank of Lagoon #3 showing no dike structure present. Land slopes gently from lagoon to bottom of picture.

See PHOTOS #5 + #6.

4

5

Photographer facing North.
Photo of South side of Lagoon #3 showing no dike structure present and how land slopes away from lagoon.

See PHOTOS #4 + #6.

5

6 Photographer facing North.
Photo of South side of Lagoon #3 (Black Arrow) from ditch along railroad tracks (See Figure 2.).

See PHOTOS #4 + #5.

6

14 Photographer facing Northeast.
Photo of Lagoon #6 (same s[redacted] as in Photo #13) showing high water line (No free board).

See Photos #13, #15, #16, & #17.

14

13 Photographer facing Northeast.
Photo of Lagoon #[redacted] showing high water line (No free-board) and general slope of land from lagoon to ponded water (Black arrow). Lagoon #5 is in background (Red arrow).

See PHOTOS #14, 15, 16, 17.

13

16 Photographer facing Northwest.
Photo of Lagoon #6, left-hand border of picture, showing liquid leaking from lagoon to ponded water. Leaking liquid is shown by Black arrow. Photo is same as Photo #15.

See PHOTOS #13, #14, #15, & #17.

16

15 Photographer facing Northwest
Photo of Lagoon #6, ~~showing~~ left-hand border of picture (Red arrow), and two leaks (indicated by liquid flowing to ponded water) (Black arrows).

Land slopes from lagoon at left-hand border to ponded water.

See PHOTOS #13, #14, #16, & #17.

15

18 Photographer facing East.
Photo of ponded water, noted in photos #13, #15, and #16, along south side of lagoon #6. Lagoon #5 is in background (Red Arrow). Photo also shows how land slopes around by railroad tracks to the east (Black arrow).

See PHOTOS #13, #14, #15, #16, #17.

18

17 Photographer facing North.
Photo taken of far side of lagoon #6. Photo shows the high water line (No free-board) along North end of lagoon, which is noted in the photos listed below.

See PHOTOS #13, #14, #15, & #16.

17

8 Photographer facing North. Photo of Lagoon #2 showing land sloping from corner of lagoon to right-hand border of picture.

See Photos #7 + #9

8

7 Photographer facing West. Photo of Lagoon #2 showing general slope of land from lagoon to lower righthand corner of picture.

See Photos #8 + #9.

~~See Photos~~

7

10 Photographer facing Northeast. Photo of Lagoon #5 showing break in dike (Black Arrow) and high water line at break.

See Photos #11 + #12.

10

9 Photographer facing East. Photo of Lagoon #2 showing high water line (no free-board) and general slope of land away from upper right-hand corner of lagoon.

See Photos #7 + #8.

9

11 Photographer facing Southwest. Photo of Lagoon #5 showing outside view of break in dike noted in Photo #10. Note the high water line near the break.

See Photos 10 + 12

11

12 Photographer facing North. Photo of Lagoon #5 showing high water line (no free-board) in far left-hand corner. Black arrow indicates break in dike noted in Photos #10 + #11.

See Photos #10 + #11.

12

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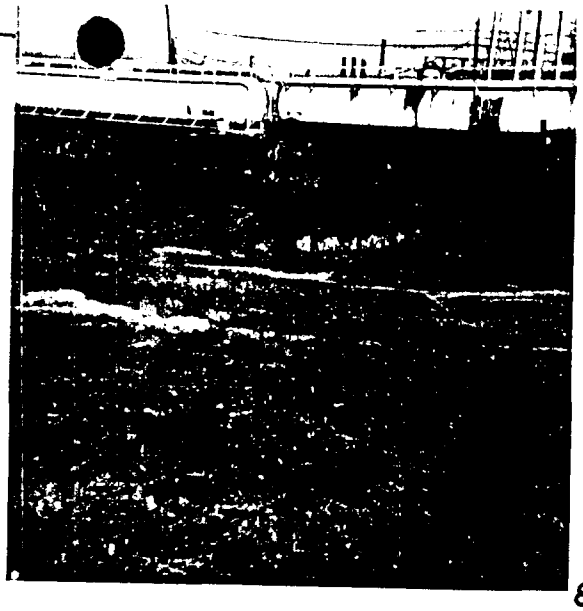

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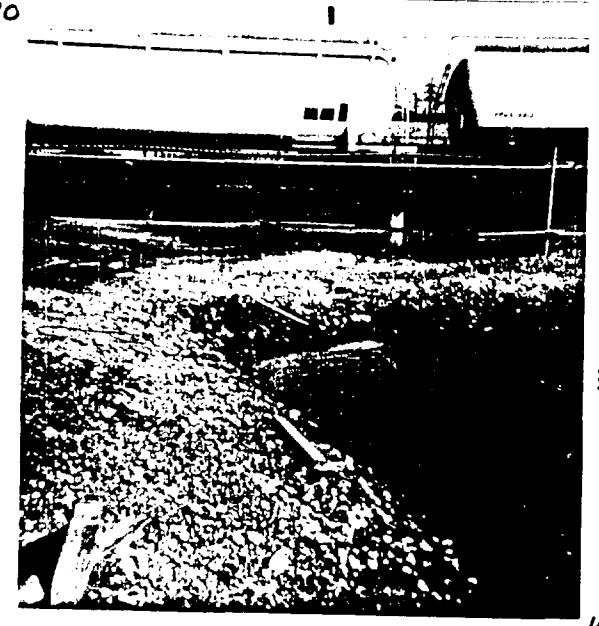

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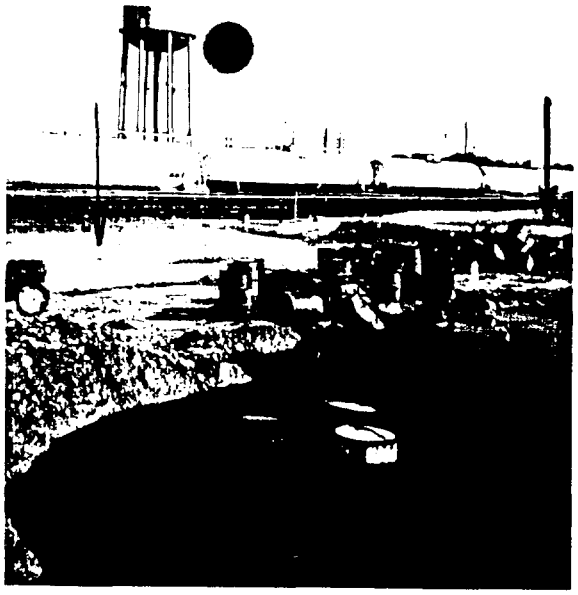

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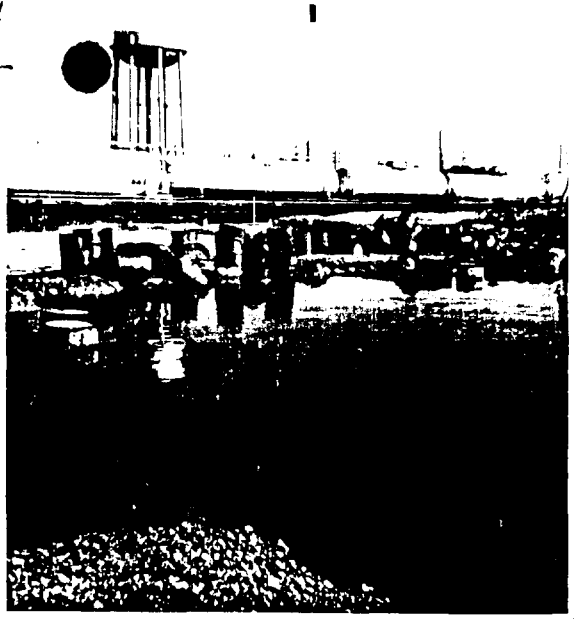

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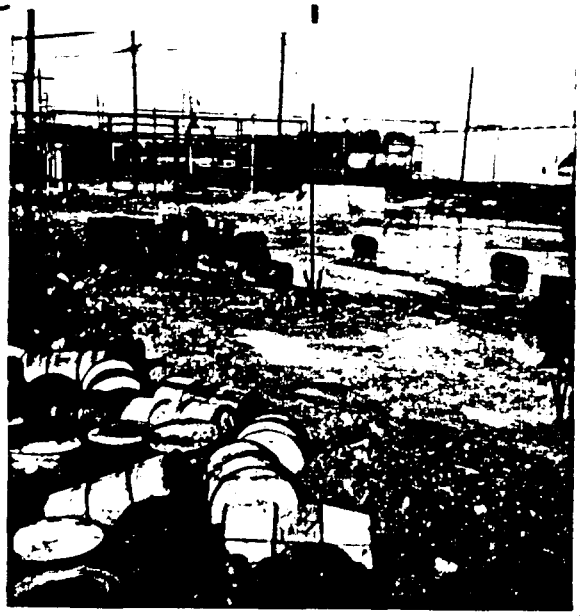

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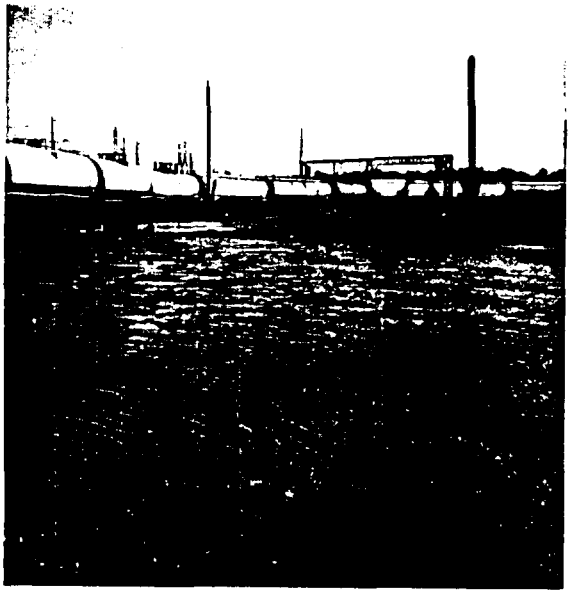

18

ETREX CHEMICAL INDUSTRIES, INC.
CHEMICALS DIVISION • P. O. BOX 623 • ASHTABULA, OHIO 44004
TELEPHONE 216 997-6131

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September 28, 1982

Ohio EPA
Northeast District Office
2110 E. Aurora Road
Twinsburg, Ohio 44087-1969

Attention: Diane M. Sigler
Environmental Scientist

Subject: Ferric Chloride Spill of Sept 21, 1982

Dear Ms. Sigler:

The ferric chloride spill was investigated and the information obtained is as follows:

At approximately 3:00 P.M. on Sept 21, 1982. Siegfried Horn our plant chemist stopped in my office to inquire why the OEPA had been in the area since sometime before noon. He assumed that the OEPA had stopped in the office since they were in our front yard and surrounding area. S. Horn then stated he had checked Fields Brook at the west side of the State Road bridge and found the water brown in color and our flow at 002 slightly orange in color.

Since the OEPA had not called at the office and I was not aware we had a problem in the plant, S. Horn and I checked Fields Brook again about 3:30 P.M. and found traces of what appeared to be ferric chloride in the water. We then looked in the diked area in the plant where 40% ferric chloride solution is stored and found traces of ferric chloride. This ferric was mixing with clear water discharging from the ferric chloride storage tank which was being cleaned so rubber-lining repairs could be made. Further investigation revealed that a 2000 gallon glass lined vessel being used for temporary storage of ferric chloride was empty. This tank should have contained about 2000 gallons of 40% solution.

At 4:30 P.M. I called the OEPA emergency response number and reported the spill to the answering service. At 5:20 P.M. I called the Washington, D.C. response number and reported the spill to Chief Petty Officer Plow.

After interviewing all plant personnel it is still not known if the ferric chloride leaked out of the glass lined storage vessel, or was drained out by opening a discharge valve. The two valves in the discharge header did not appear to leak when checked after the tank was found empty. None of the operators on the afternoon and night shifts admit to opening or closing either drain valve. The glass lined vessel is located within a containment dike with two (2) other reactors and one (1) storage tank. The dike area has a drain which is normally closed. At the time of the spill this drain was open to permit discharge of the last 1000 gallons of clear water from the ferric storage tank.

After leaving the dike area, liquid enters the floor drains in the building, flows through two sumps and finally discharges into a manhole east of Outfall 002. From 002, flow is west to the main whose flow is from the north out of RMI and Diamond. The combined effluent then discharges directly into Fields Brook on the west side of State Road at our south property line.

A ferric chloride inventory has been completed and it indicates that 18,000 pounds of 40% material were discharged to Fields Brook.

The spill has been discussed with both operating and supervisory personnel to determine what steps could be taken to limit or avoid discharges. Current spill prevention procedures are being reviewed with our Risk Management Group for suggestions to control future spills.

Sincerely yours,

DETREX CHEMICAL IND., INC.

Charles U. Guy
Plant Manager

vc

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ENFORCEMENT REFERRAL

TO: Linda Ridenour, Litigation Screening Committee
Office of OLPC

FROM: (Name of District Engineer) Melinda Merryfield-Becker
District/Local:

DATE: 11/21/80

1. (a) Name of entity: Detrex Chemical Industries, Inc.

(b) Complete address of entity: P.O. Box 623, Middle Road, Ashtabula, Ohio 44004

(c) Telephone number of entity: 216-997-6131

(d) Name(s) of responsible entity personnel: Charles Guy, Plant Manager; I. H. Shamiyeh, Corporate Office

(e) Permit (license) status: No effective NPDES permit (NPDES F 317), No landfill license required.

2. Violation Description

(a) Location of violation (be specific): Potential leachate from closed lagoon entering Fields Brook at former outfall 001 and 002, via surface runoff and possibly ground water infiltration.

(b) Nature of violation. Include a brief description of violation, a statement of how long or how often violation has occurred, and environmental and/or health effects of violation.

Six lagoons used in the production of trichloroethylene were closed 7/25/77. The Agency was involved in the closure and informally approved the action. Also, three lagoons which are now covered were found during the 5/8/80 inspection. These lagoons contained hexachlorobutane.

ATTACHMENT A (Contd)

9/10/80 Meeting at NEDO. Material buried in the lagoon area discovered during the 5/8/80 inspection was identified as hexachlorobutane. Detrex is considering disposing of this waste via rotary kiln incineration.

Detrex wishes to go ahead with repairing clay cap. NEDO encouraged them to wait until we know more about ground water. Requested that Detrex do a hydrogeologic study and drill monitoring wells. Detrex agreed to inform NEDO by 10/03/80 with their answer.

9/11/80 U.S.EPA sent Detrex a 311 letter.

9/29/80 Mr. Shamiyeh called to inform us that Detrex would not voluntarily perform the hydrogeologic study.

(c) Have there been complaints from the public against this entity? Describe briefly.

No complaints from the public appear in our records.

(d) Describe enforcement action already taken against entity for this violation (including letters, telephone calls, meetings). Attach copies of all correspondence with entity regarding this violation.

See Attachment A

(e) What is entity's history of compliance or noncompliance? Describe briefly entity's past violations, when they occurred, and whether the entity took steps to remedy such violations.

N/A No NPDES permits limited the parameters of concern.

(f) Are there extenuating circumstances which explain or justify the violation? Describe.

N/A

(g) Describe any possible measures to remedy the violation.

Order the entity to conduct a hydr[illegible]logic study and if necessary, install

Enforcement Referral
Name of Entity: Detrex Chemical Industries, Inc.

Continuation of (b)

The Agency had no former knowledge of these lagoons. Our own geological review indicates that ground water contamination is possible and that this aquifer may act as a recharge for Fields Brook. Significant concentrations of chemicals associated with trichloroethylene production have been found in the former 001 outfall (see analytical data). In some cases, these concentrations have exceeded the proposed U.S.EPA WQS for these parameters. Tetrachloroethane is "considered the most toxic of the common chlorinated hydrocarbons" according to SAX (see Attachment B). Trichloroethylene is found on both the priority pollutant list and the 311 Hazardous Waste List.

(g) (contd.) and establish whether ground water infiltration ~~is contributing~~ to surface water contamination. ~~Submit plans for abatement of surface water~~ contamination. Submit plans for abatement of surface water contamination ~~and~~ enact plans according to a compliance date contained in orders.

3. Request for Enforcement Action

(a) Name and phone number of all OEPA and local agency personnel responsible for or having information on this entity or violation:

Melinda Merryfield-Becker (216) 425-9171

William Skowronski (216) 425-9171

Deborah Berg (216) 425-9171

(b) What type of enforcement action do you recommend? Directors Findings and Orders. See Draft Orders

(c) Do you recommend this violation be made public? NO - No violation of existing regulations established.

(d) Attach copies of all correspondence, memoranda, laboratory and inspection data, photographs, permits, etc. that relate to this violation.

Signed: Melinda Merryfield-Becker Date: 12/01/80

Approved: [signature] Date: 12-01-80
(Assistant Chief)

****

LITIGATION SCREENING COMMITTEE

Action Recommended:

Assigned To:

Date:

ANALYTICAL DATA

WQS (Proposed Federal)

Trichloroethylene	- max.	3400 ug/l	- avg.	1500 ug/l
Tetrachloroethylene	- max.	700 ug/l	- avg.	310 ug/l
1,1,2,2 Tetrachloroethane	- max.	380 ug/l	- avg.	170 ug/l
1,1,2 Trichloroethane	- max.	710 ug/l	- avg.	310 ug/l

Analyst	Trichloro-ethylene	Tetrachloro-ethylene	1,1,2 Trich-loroethane	1,1,2,2 Tetro-chloroethane
Detrex 002 4/14/80	27 ppb	---	7 ppb	159 ppb
Detrex 002 5/5/80	46 ppb	---	6 ppb	73 ppb
Detrex 002 5/8/80	50 ppb	---	5 ppb	86 ppb
Detrex 001 Trucks 5/8/80	44 ppb	---	5 ppb	89 ppb
Detrex 001 Final 5/8/80	65 ppb	---	17 ppb	366 ppb
Detrex 001 Trucks 5/22/80	240 ppb	---	40 ppb	---
Detrex 001 Final 5/22/80	220 ppb	---	4 ppb	---
ODH 001 5/19/80	159.65 ug/l	15.72 ug/l	---	102.08 ug/l
ODH 002 5/19/80	158.05 ug/l	42.64 ug/l	---	214.47 ug/l
OH Materials 002	589 ppm	218 ppm	21 ppm	ND
OH Materials 001	179 ppm	21 ppm	trace	ND

ATTACHMENT A

Chronology of Correspondence With Detrex Chemicals.

3/5/75 Memo to Donald Seeds from Raymond Schaefer - geological study of Detrex potential for water contamination due to mercuric sludges stored in lagoons. Effect of hydrocarbons not addressed. Potential for area to act as recharge for Fields Brook is mentioned.

11/9/75 U.S.EPA report of inspection conducted 10/15/75. Grab sample of 002 found to contain trichloroethylene.

12/19/75 Letter from I. H. Shamiyeh proposes to plug manholes A-7 and B-7 to eliminate organics in 002 discharge.

1/7/76 Letter confirming 12/15/75 meeting. Subject: (1) discharge of organics via outfall 002. Plugging and cleaning sewer lines proposed to eliminate organic discharge. (2) disposal of wastewaters in the lagoons.

2/6/76 Update letter from W. G. Robrecht, Detrex construction started in regards to sealing manholes. Investigating proper disposal alternatives for wastewater.

3/10/76 Letter from Detrex confirming telephone call. Manholes sealed. Still negotiating disposal of wastewater.

5/12/76 Update letter from Detrex "Hexane Solubles" believed to be equal to trichloroethylene has dropped since lines plugged to average of 1 ppm. Ponds #1, #2, #3 emptied and covered 4/9/76. Still working to close Pond #6.

8/3/76 Meeting at NEDO. Don Seeds and Will Samkow felt current level of organic discharge acceptable. U.S.EPA notified but they had not yet replied.

7/25/77 All ponds are closed. Notification sent to Russ Hart at NEDO.

4/16/80 Meeting at NEDO. Reviewed methods used to close ponds. Sludge hauled to Reserve Environmental Services, Ashtabula. Supernatant went to BFI -- about 1 million gallons.

5/8/80 Joint inspection with U.S.EPA for RCRA violations. New area of concern was discovered. Strong organic odors and topography suggests that this may be another old lagoon which has been covered. Samples were taken.

5/28/80 Meeting at Detrex. Reviewed existing sampling data. Samples exceed the proposed Federal Water Quality Standards for the average tetrachloroethane limit. Detrex acknowledged the runoff problem. They proposed excavating to repair the cap -- but NEDO warned that this may not solve the problem because ground water pollution would still be a potential problem and ground water may be recharging Fields Brook. We recommended that Detrex perform a hydrological study and consider installing monitoring wells. Detrex did not feel that existing data justified the cost of such a study.

Note: Although the pond closure was approved by OEPA. There is no data concerning the permeability of the clay.

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Hydrogeological Assessment
Diamond Shamrock
Process Chemicals Facility
Ashtabula, Ohio

Prepared for:

Diamond Shamrock Chemicals Company
P.O. Box 488
725 State Road
Ashtabula, Ohio 44004

Woodward-Clyde Consultants

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

32111 Aurora Road
Solon, Ohio 44139
216-349-2708

Woodward-Clyde Consultants

85C7101

28 March 1986

Diamond Shamrock Chemicals Co.
P.O. Box 488
725 State St.
Ashtabula, OH

Attention: Mr. Fred Leitert

HYDROGEOLOGICAL ASSESSMENT
DIAMOND SHAMROCK PROCESS CHEMICALS FACILITY
ASHTABULA, OHIO

Gentlemen:

In accordance with your request, Woodward-Clyde Consultants (WCC) is pleased to present the results of our Hydrogeological Assessment for the Diamond Shamrock Process Chemicals Facility in Ashtabula, Ohio. The project has been performed under your Purchase Order No. 61424, as modified by our letter dated 18 November 1985.

If you have any questions concerning the above, do not hesitate to contact us.

Sincerely,

WOODWARD-CLYDE CONSULTANTS

James A. Morrison

James A. Morrison, P.E.
Assistant Project Engineer

JAM/em

HYDROGEOLOGICAL ASSESSMENT
DIAMOND SHAMROCK PROCESS CHEMICALS FACILITY
ASHTABULA, OHIO

Prepared for:

Diamond Shamrock Chemicals Co.
P.O.Box 488
725 State Street
Ashtabula, Ohio

Prepared by:

Woodward-Clyde Consultants
32111 Aurora Road
Solon, Ohio 44139

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SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Six groundwater monitoring wells were installed and seventeen soil borings and probes were advanced to investigate potential Carbon Tetrachloride (CCL_4) contamination of soil and groundwater in the former CCl_4 storage area at the Diamond Shamrock Process Chemicals Facility in Ashtabula, Ohio. Carbon tetrachloride was detected in the groundwater at two of the monitoring wells at concentrations between 1.0 and 2.5 mg/liter. Of the 66 soil samples analyzed from 23 boring locations, CCL_4 was detected in only 10 soil samples from 7 locations.

The subsurface profile at the facility typically consists of 2 to 4 feet of fill underlain by dense, silty, glacial till. Shale bedrock was encountered at a depth of 50 feet. The glacial tills are of low permeability, with permeability generally on the order of 1×10^{-6} cm/sec. Based on a measured hydraulic gradient across the site of 0.01 ft/ft, groundwater seepage velocity has been estimated to be on the order of between 0.03 and 0.04 ft/year. Because of the low permeability of the subsurface soils below the level of fill, contaminant migration through the clay till is believed to be limited. Lateral migration of CCl_4 may have occurred through the near surface fill soil or along preferred pathways such as along underground piping systems. The near surface fill may have allowed surface migration of CCl_4 by storm water run-off into the storm water collection system.

Carbon tetrachloride was detected in the soil and groundwater in the vicinity of the former CCL_4 Storage Area and the former Flammable Drum Storage Pad. Because groundwater is not used for human consumption or utility at or near the plant site, it does not appear that the levels of CCl_4 found in the soil and groundwater pose a threat to human health or the environment.

The process water line and any other underground pipeline could be causing a "short circuit" for contamination to directly reach effluent structures South of the

former CCL_4 Storage Area. This investigation, however, has not been able to substantiate this theory and further investigation is required.

With the present data, it is not possible to define the extent of contamination south (downgradient) of the former Flammable Drum Storage Area. Data from additional soil probes and additional monitoring wells will be required to assess if this area is promoting CCl_4 contamination of the plants' effluent system.

Recommendations

This investigation stems from the finding of CCl_4 in the plant process water outfall. It is recommended that water samples be collected simultaneously from the discharge (NPDES monitoring) point, the treatment lagoons and points of beginning and discharge of all storm lines and process water lines that enter the water treatment system. The water samples are to be sampled for CCl_4. A mass balance for CCL_4 could then be performed across the process and storm water treatment system. From this information, it may be possible to narrow the focus on the possible source of CCl_4 infiltration into the system. The testing of water samples could be done in steps, beginning with the discharge sample and continuing "upstream" to the point where clean inflow water is detected. If an input source is identified, potential pathways could be investigated and possible remedial action to seal a potential input source, if necessary, could then be undertaken.

A second phase hydrologic investigation should also be conducted to assess potential CCl_4 migration downgradient (south) of the area covered by the first phase investigation. This study should include the installation of additional monitoring wells and a chemical analyses of additional soil probes. The field investigation should be closely coordinated with the CCl_4 mass balance study to identify any source(s) of CCl_4 contamination of the outfall.

HYDROGEOLOGICAL ASSESSMENT
DIAMOND SHAMROCK PROCESS CHEMICALS FACILITY
ASHTABULA, OHIO

1.0 PROJECT DESCRIPTION

As part of an NPDES permit renewal for the Diamond Shamrock - Ashtabula Process Chemicals facility, carbon tetrachloride (CCl_4) was detected in water sampled from the plant's process system outfall. Carbon tetrachloride is not used by Diamond Shamrock in any of the processes currently in operation. Carbon tetrachloride was used prior to 1978, and was stored in above-ground tanks adjacent to the present process building. A preliminary in-house investigation by Diamond Shamrock personnel of soil and shallow groundwater in the vicinity of the former CCl_4 storage area indicated possible contamination with CCl_4.

Woodward-Clyde Consultants (WCC) was retained by Diamond Shamrock to perform a hydrogeological investigation at the site. The objectives of the investigation included the following:

- Locate potential sources of CCL_4 contaminating the outfall
- Assess the migration potential of CCl_4 from the former CCl_4 Storage Area
- Assess the vertical and horizontal extent of contamination
- Evaluate groundwater flow at the facility
- Evaluate if useable groundwater has been contaminated

2.0 REGIONAL GEOLOGY AND HYDROGEOLOGY

2.1 General Geology

The Diamond Shamrock Ashtabula facility is located within an area geologically defined as the Eastern Lake Section of the Central Lowland Province, or commonly referred to as the Lake Plain. The Lake Plain borders Lake Erie and is

characterized by a narrow plain with a relatively flat surface, ranging between 3½ and 5 miles in width, and gently sloping towards Lake Erie. The northern margin of the Lake Plain along the present shoreline of Lake Erie, in the vicinity of the Ashtabula facility, terminates as a bluff ranging from 20 to 80 feet in height. The Lake Plain then rises toward the south at a gradient of approximately 10 ft. per mile. The southern margin is marked by an abrupt rise in elevation, or escarpment, which also marks the beginning of glacial end moraine deposits. Drainage is typically poor due to the relatively flat surface and the nature of the soils of the Lake Plain.

Lacustrine deposits consisting of silts and fine sands reportedly cover the upper surface of the Lake Plain to a depth of 5 to 10 feet. Underlying the lake silts and sands are a series of till deposits that are typically composed of dense clayey silts. In this area, tills generally consist of an unsorted, unstratified mixture of sediments of various sizes (often containing small rock fragments) but primarily containing fine-grained sediments. The various till layers are sometimes separated by thin lenses (4 to 6 inches) of more permeable silt or fine sand. The till units extend to the bedrock surface. In the vicinity of the plant site, bedrock is reported to be approximately 50 feet below the surface.

Bedrock beneath the site consists of Devonian Age shales, which locally may be several hundred feet thick. The uppermost formation is reported to be the Ohio shale (Cleveland Member) which is typically a black carbonaceous shale.

2.2 General Hydrogeology

Groundwater Availability - According to information published by the Ohio Division of Geologic Survey, wells developed in the unconsolidated deposits yield very little groundwater (less than 5 gpm). Because of the low permeability of the unconsolidated deposits, wells in these materials are generally pumped dry quickly and take a considerable amount of time to fully recover. Wells developed in the upper, weathered portion of the shales typically yield less than 3 gpm. Below that depth, very minimal supplies would be available.

Groundwater Use - Groundwater is generally considered an unavailable and an unimportant source of water in this region. The Ohio Department of Natural Resources -Division of Water has no record of potable water wells within one mile of the site.

3.0 SITE CONDITIONS

The Diamond Shamrock - Process Chemicals facility is located in Ashtabula Township, Ohio. Figure 1 was prepared from a 1978 photo-revised U.S. Geological Survey map of the Ashtabula North quadrangle, and shows the location of the facility in relation to its surroundings. The site occupies approximately 40 acres, and is bounded on the east by State Road and on the north by E. Sixth St. The topography of the site is flat, with surface drainage to the south and west. As shown on Figure 1, the site is within one mile of the Ashtabula River to the west, and within 0.6 miles of Lake Erie to the north. Also within one mile of the site to the south and east are several large chemical process facilities and industrial facilities. The nearest residential areas are approximately 0.3 miles to the northwest.

The general site plan of the facility is shown in Figure 2. The site plan was obtained from Diamond Shamrock personnel, and in addition to showing existing structures, indicates the outline of the proposed new processes building located on the former flammable drum storage pad.

Potable water is provided to the plant by the Ohio - American Water Co., Inc. along E. Sixth St. Process water for the facility (non-potable, filtered lake water) services the plant through a 12-inch water line that crosses State Road south of the process buildings, and enters the plant from the south. The approximate location of the water line is shown on Figure 2. Storm water and process water is drained to the lined effluent ponds. The water is then treated and discharged into a municipal storm sewer which runs along the east side of the facility property (Refer to Figure 2). Carbon Tetrachloride was detected at this discharge point.

Carbon tetrachloride was formerly brought into the facility by tank truck and unloaded south of Process Area IV (Refer to Figure 2). The CCl_4 was pumped from

the tankers in above-ground lines to storage tanks located south of process Area 4. From the storage tanks, CCl_4 was pumped through above-ground lines into day tanks immediately east of Process Area V. The use of CCl_4 was ceased in approximately 1978, and the storage tanks were reportedly removed the same year.

4.0 FIELD INVESTIGATION

The field investigation at the Diamond Shamrock facility included drilling exploratory borings and shallow soil borings, installation of groundwater monitoring wells, water sampling and permeability testing. Details of the various tasks performed are described below.

4.1 Exploratory Borings

Six exploratory soil borings were drilled by Rochester Drilling Co. of Rochester, New York during the period of 30 October to 4 November 1985 under the supervision of a WCC field geologist. The borings were advanced using 4¼" I.D. hollow-stem augers with Standard Penetration Testing (SPT) in general accordance with ASTM D-1586. Locations of these borings are shown in Figure 3. All borings were sampled at 2½-foot intervals to a depth of 15 feet below ground surface and at 5-foot intervals thereafter. All borings terminated at approximately 20 ft. below ground surface with the exception of boring MW-4 which was advanced to bedrock, and terminated at a depth of 54 feet below ground surface. Samples were obtained using a 2-inch-diameter split-barrel sampler, with each sample visually classified in the field by a WCC geologist. Samples were placed in sealed jars and returned to the WCC soils laboratory for further analysis. In addition, selected samples for chemical analyses were placed into glass jars supplied by the testing laboratory. These samples were packed on ice in insulated shipping coolers immediately after collection. Logs of exploratory borings are included as Figures A-1 through A-13 in Appendix A. Each of these borings were subsequently converted to groundwater monitoring wells.

Between each sample, the split-barrel sampler was cleaned in a three-step procedure. First, the equipment was scrubbed and washed with a detergent solution (Liquinox) and then rinsed with distilled water. Second, the sampler was rinsed with

reagent-grade methanol. Finally, the equipment was again rinsed with distilled water from a high pressure sprayer. In addition, the augers were cleaned before and after each boring using a high-pressure, hot water sprayer.

In addition to the exploratory borings described above, seven other exploratory borings were drilled between 7 and 9 November 1985 at the location of the proposed new process building. The locations of the borings are shown on Figure 3. The results of the borings were presented in WCC's report "Geotechnical Investigation for Proposed Process Building" dated 16 December 1985. The logs of the soil borings and the laboratory tests performed are included with this report in Appendix B for reference.

4.2 Monitoring Well Installation

Upon completion of drilling of the six initial exploratory borings, a permanent groundwater monitoring well was installed in each borehole. The wells were constructed of 2-inch I.D., PVC riser pipes with 10-foot long, slotted (0.010-inch) PVC well screens. Construction diagrams for each well are included with Appendix A, following each corresponding Log of Boring. Upon completion of each boring, the augers were removed and the well pipe lowered into the borehole. A sand pack, consisting of a washed, medium sand, was installed to a minimum of 2 feet above the top of the screen. A bentonite pellet seal was placed on top of the sand pack to a thickness of at least 2 feet. The remainder of the boring was backfilled with cement-bentonite (C-B) grout to the ground surface. To provide security for the monitoring wells, a 4-foot long section of nominal 4-inch-diameter steel casing with a hinged, locking cap was installed in the grout such that the top of the casing was slightly above the top of the PVC. Following installation of all monitoring wells, each well was developed by bailing and compressed air techniques.

4.3 Shallow Soil Borings

In order to delineate the approximate extent of CCl_4 contamination, 13 shallow soil borings were made in the general vicinity of the former CCl_4 storage tanks. Locations of the shallow soil borings are shown on Figure 3.

The shallow soil borings were drilled by Rochester Drilling during the period of 1 through 6 November 1985. Each shallow boring was advanced to a depth of 6 feet. From 0-2 feet, a sample was obtained by pressing a three-inch-diameter, split-barrel sampler directly into the soil. Separate 2-inch-diameter, split-barrel samplers were then used from 2-4 feet, and from 4-6 feet below ground surface. A representative portion of each sample was retained for chemical analysis and placed in a sealed glass jar provided by the testing laboratory. All samples were packed on ice in insulated shipping coolers immediately after collection. All sampling equipment was cleaned using the procedure outlined in Section 4.1.

4.4 Water Sampling

Groundwater samples were collected from each of the monitoring wells on 11 November and 2 December 1985. Prior to sampling, the static water level was measured in each well, and each well was purged to allow fresh groundwater to enter the well. Due to the relatively low permeability of the soil in the area, each well was able to be bailed dry. Water levels were allowed to recover to essentially static conditions prior to sampling. The bailer and bailer line used for purging were rinsed with methanol and then with distilled water between wells.

Groundwater samples were collected using a "Kemmerer" type sampler. Samples were transferred to appropriate containers and placed on ice in insulated shipping containers immediately after collection. To evaluate field quality control, a blank sample was prepared during the first sampling event. To prepare the field blank, distilled water was passed through the Kemmerer sampler and into a sample jar. The Kemmerer sampler was cleaned prior to preparation of the blank in the same manner as if a normal sample was to be obtained. A sample number was assigned to the field blank in such a manner as to preclude identification by the testing laboratory. Chain of custody protocols were maintained and copies of these records appear in Appendix C.

4.5 Permeability Testing

To estimate the hydraulic conductivity (permeability) of the strata screened by the monitoring wells, a rising-head test was performed in MW-4, MW-5 and MW-6

by WCC personnel on 3 January 1986. The test generally consists of measuring the rate at which the water level in a well returns to essentially the static level after a volume of water is removed. The test is used to estimate the permeability of the strata only in the immediate vicinity of the well tested.

The test was performed by bailing approximately 5 feet of water from MW-5 and MW-6, and approximately 34 feet of water from MW-4. The change in water head was monitored by lowering a tape measure with an acoustic water level indicator down each well at regular time intervals. The permeability was then calculated for the screened interval at each well according to prescribed methods.

5.0 SITE SOIL AND HYDROGEOLOGIC CONDITIONS

The soils encountered in the borings consisted of either clay topsoil or coarse fill underlain by stiff, silty soil of glacial origin. Figure 4 presents a geologic cross-section through the site, and graphically illustrates the strata encountered.

The fill encountered consisted primarily of sand, gravel and cinders with varying amounts of clay and rubble. The depth of fill, where encountered, ranged between 1.5 feet and 4.0 feet.

The fill material beneath the plant site is generally underlain by a sandy, clayey silt unit. In some locations it resembles lacustrine deposits (no rock fragments) while in others it resembles till. This unit extends to a depth of approximately 10 feet, is generally brown or brown and gray and clayey and may be the uppermost till sheet.

Underlying this unit, and extending down to the bedrock surface at a depth of approximately 50 feet, is a gray till that varies in composition between a sandy, clayey silt to a clayey silt. This unit contains numerous small rock fragments, which are mostly black or gray shale, and is occasionally interbedded with thin, discontinuous sand layers and lenses. According to published geologic reports, the thin sand lenses are often located between the various till sheets. Sand layers were only encountered in Boring MW-1 between 13 and 15 feet and in P-2 between 5 and 6 feet. A geologic cross-section through the plant site was prepared. The location of the cross-section is shown on Figure 3 and the cross-section is presented as Figure 4.

5.1 Hydrogeological Conditions

Based on water levels in six monitoring wells measured on 11 November and 2 December 1985 and 3 January 1986, generalized groundwater contour maps were prepared and are presented as Figures 5, 6 and 7. A summary of groundwater elevation measurements is presented in the following table:

GROUNDWATER MEASUREMENTS

Monitoring Well Elevations (Ft.)			Groundwater Elevations (Ft.)		
Well No.	Ground Surface	Top of Well	11-11-85	12-2-85	1-3-86
MW-1	638.5	640.73	637.2	637.5	637.4
MW-2	640.6	642.63	639.2	639.1	638.4
MW-3	638.7	640.11	633.9	635.7	636.3
MW-4	639.7	643.17	634.4	635.1	635.8
MW-5	639.2	641.65	636.0	638.1	638.7
MW-6	639.7	642.54	635.9	636.5	636.0

In general, groundwater flow appears to be toward the southwest. On 11 November 1985, the measured groundwater levels (refer to Figure 4) indicate a relatively uniform hydraulic gradient of 0.01 ft./ft. across the site. On 2 December 1985 (Figure 5), groundwater levels appeared to be rising in the vicinity of the process building and drum storage pad. An increase in water level of approximately 2 feet was recorded in wells MW-5 and MW-3. On 3 January 1986, water levels in MW-5 and MW-3 had risen an additional 0.6 and 0.7 feet, respectively. This variation in water levels may have been influenced by several factors. Natural recharge into an aquifer of low permeability in a developed area may result in a seasonal non-uniform groundwater flow regime.

The depth to groundwater in the monitoring wells was generally within four feet of the surface in what appears to be the uppermost lacustrine/sandy till layer.

Permeability of the silty till soil above the shale is estimated to be on the order of 10^{-6} cm/sec. The results of the rising head test performed on wells MW-4, MW-5 and MW-6 are tabulated below.

PERMEABILITY FROM RISING-HEAD TESTS

Well No.	Screened Section Depth Interval	Calculated Permeability Based on Field Measurements (cm/sec)
MW-4	44 - 54 ft.	1.1×10^{-6}
MW-5	10 - 20 ft.	1.6×10^{-6}
MW-6	10 - 20 ft.	4.6×10^{-6}

The coefficient of permeability was also interpolated in the laboratory based on the results of consolidation tests performed on soil samples obtained from Boring B-5 at depths of 12 feet and 22 feet. Refer to Appendix B, Figures B-6, B-9, and B-10. The results of the computed coefficient of permeability at various levels of effective stress are presented graphically in Figure 8. The results indicate an estimated permeability between 2 and 4×10^{-7} cm/sec in the range of effective stresses corresponding to the depth of the silty till. Typically, the results of permeability estimated from laboratory samples will be lower than "in-situ" testing such as slug testing due to several factors, including: sample disturbance; obtaining small, selected samples without sand seams or higher permeability zones; measuring permeability in primarily a vertical direction rather than horizontal, and under flow gradients much higher than in field conditions. Taking these factors into account, the results of the coefficient of permeability computed from the consolidation test are within general agreement with results of the slug testing.

The velocity of groundwater flow in the silty till has been estimated by Darcy's seepage velocity equation:

$$V = \frac{Ki}{n}$$

Where: V = seepage velocity
K = hydraulic conductivity (permeability)
i = hydraulic gradient
n = porosity

Average hydraulic conductivity has been estimated as 1 x 10^{-6} cm/sec. Porosity of the clay till is estimated between 0.31 and 0.33 based on void ratio computations made during analyses of the consolidation tests performed (refer to Figures B-9 and B-10). An average hydraulic gradient was assumed as 0.01 ft/ft based on groundwater level measurements made on 11 November 1985 (Refer to Figure 4). Based on the above parameters, the groundwater seepage velocity is estimated to range on the order of 0.03 to 0.04 feet/year.

6.0 CHEMICAL ANALYSES

The chemical analyses of soil and groundwater samples were performed by Aqua-Tech Environmental Consultants of Melmore, Ohio. All samples were analyzed for carbon tetrachloride by gas chromatograph - mass spectrometer (GC/MS) analyses. A summary of the chemical analytical results is presented in Tables 1, 2, and 3.

6.1 Laboratory Quality Assurance/Quality Control

Low level (1-500 ppb) water samples were analyzed by "purge and trap" gas chromatography/mass spectrometry (GC/MS) and also "purge and trap" GC/Hall Detection. High level (500 ppb) water samples were initially diluted with laboratory reagent water and then analyzed by "purge and trap" GC/MS. (Reference Method Used: SW-846, July 1982 - Method #5030).

High level sediment samples were prepared for analysis by first extracting a known amount of sample with reagent grade methanol. The resultant extract was then dosed in laboratory reagent water and analyzed by "purge and trap" GC/MS.

Low level sediment samples were prepared by slurrying a known amount of sample in reagent water contained within a special sparging vessel. The resultant slurry was then analyzed by "purge and trap" GC/MS.

Detection limit for Carbon Tetrachloride is 0.5 µg/liter for water samples, and 0.05 mg/kg (dry weight) for sediment samples.

Each individual sample was spiked with 0.47 mg/kg of bromofluorobenzene (BFB) to monitor the purging efficiency of each sample. The following are statistical analyses of these recoveries.

Average % recovery of BFB: 90.8%
Standard Deviation: 10.2%

A standard containing all of the compounds of interest was analyzed at a frequency of 10%. The system was recalibrated when the response factors varied by more than 20%. Several samples were also run as duplicates in the lab to assume consistency of analytical work.

6.2 Assessment of Chemical Analytical Results

Carbon tetrachloride was found in the groundwater at two of the six monitoring wells. In the former storage area, 1.5 milligrams per liter (mg/l) were detected in MW-4. Downgradient of MW-4 and immediately south of the former flammable drum storage pad, 2.5 mg/l CCl_4 were detected in MW-3. These findings were generally confirmed by the second groundwater sampling event on 2 December 1985.

Carbon tetrachloride was also found in the soil samples in the former CCl_4 storage area and downgradient of the former storage area. The highest concentrations detected in the soil were 160 mg/kg and 200 mg/kg in the soil collected from Boring MW-3, at sample depths of 3 feet and 8 feet, respectively. The highest concentration detected in the former CCl_4 storage area was 28 mg/kg in the soil collected from MW-4 at a depth of approximately 3 feet. Carbon tetrachloride was also detected in shallow soil borings P-3, P-5, P-6, P-12 and P-13,

at concentrations between 0.22 mg/kg and 2.4 mg/kg. With the exception of probe P-6, CCl_4 was only detected in the bottom probe samples at depths between 4 and 6 feet. In P-6, CCl_4 was also found in the surface sample at a concentration of 0.22 mg/kg.

7.0 SUMMARY OF HYDROGEOLOGICAL ASSESSMENT

Based on the measured water levels in the groundwater monitoring wells, the direction of groundwater flow appears to be toward the south-southwest. Measured groundwater levels were typically one to four feet below the ground surface. Permeability of the soil, based on the results of the rising head tests performed, is estimated to be on the order of $1x10^{-6}$ cm/sec.. Based on the estimated permeability and the relatively uniform hydraulic gradient of 0.01 ft./ft. observed on 11 November 1985, the groundwater seepage velocity is estimated to be on the order of 0.03 to 0.04 feet/year.

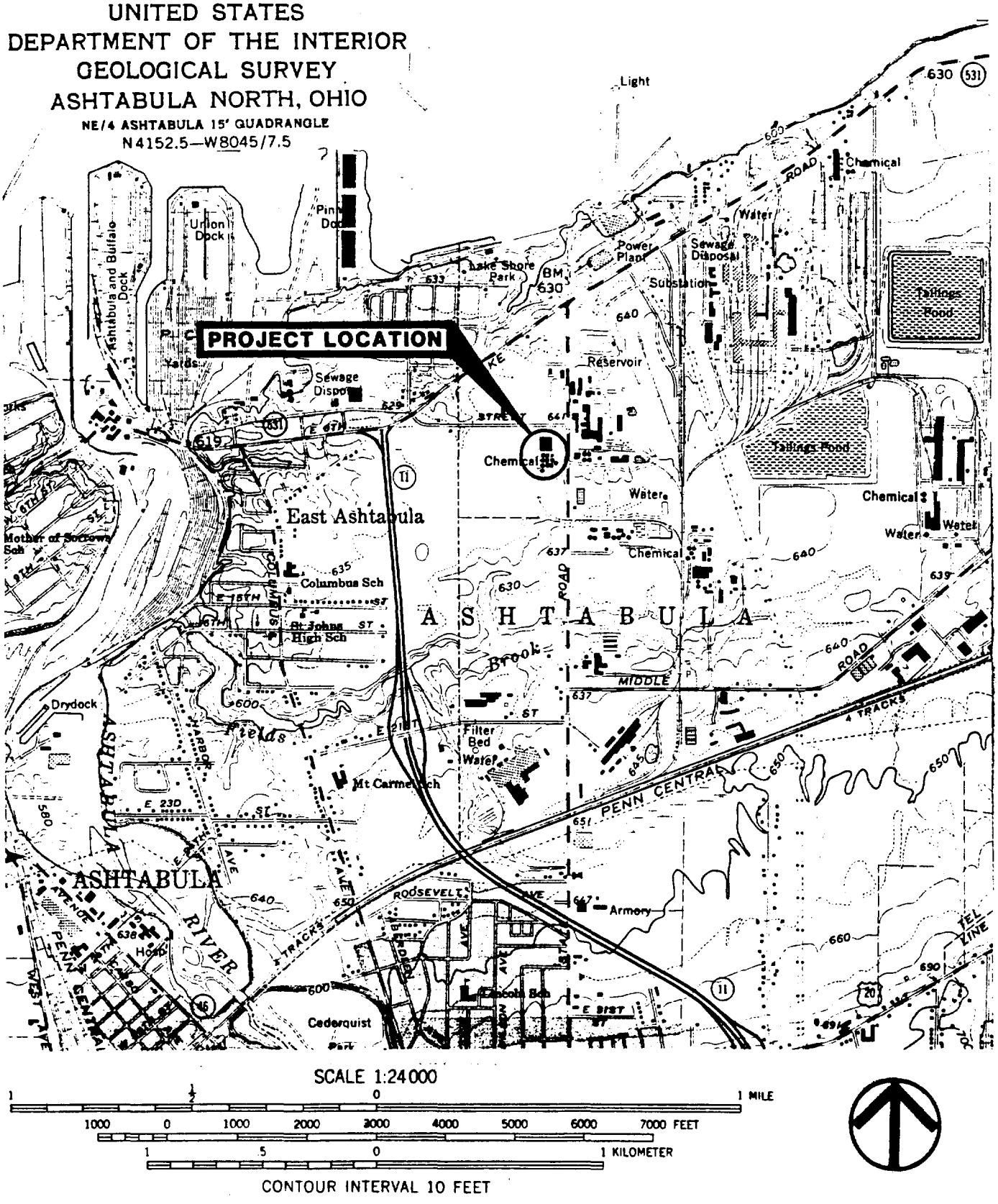
Carbon tetrachloride was detected in the groundwater in the former CCl_4 storage area (MW-4) and south of the former flammable drum storage pad (MW-3). The locations of these areas are shown on Figure 3. Since the highest concentration of CCl_4 was found in the downgradient well (MW-3), the lateral extent of CCl_4 contamination in groundwater cannot be determined from available data. Because CCl_4 was found in the groundwater in MW-4, it would appear that CCl_4 has migrated vertically through the soil deposits at least to a depth of 34 feet, or the top of the sand pack in this area. Chemical analysis of the soil samples recovered from MW-4 did not indicate a uniform distribution of contaminants in the soil strata.

Carbon tetrachloride was detected in some soil samples in the immediate vicinity of the former CCl_4 storage area, west of the storage area, and at one point beneath and one point south of the former flammable drum storage pad. Concentrations of CCl_4 detected in these areas were typically less than 1 mg/kg, with the exception of MW-4 (28.1 mg/kg at 2.5 to 4 feet) and MW-3 (160 mg/kg and 200 mg/kg between 2.5 and 8.5 feet). With one exception (P-6), CCl_4 was only detected in the natural soil below the level of fill. Spillage from the former CCl_4 storage area may have permeated the upper fill layer. Carbon tetrachloride may have migrated laterally from the former storage area along the fill/soil interface to

the south and west (P-12 and P-13). The higher concentrations detected south of the flammable drum storage pad (MW-3) may be the result of a local, secondary CCl_4 spill in that area.

Shallow soil borings P-6 and P-11 were placed within three feet of the estimated location of the 12-inch process water feed line in an attempt to intercept the backfill around the pipe. Since CCl_4 was detected in soil from P-6 and not in P - 11, it is not evident whether CCl_4 is migrating through the water line backfill as a potential preferred pathway. Typically, pipelines such as the 12-inch process water line are bedded in granular soil. Since CCl_4 was typically found at the approximate depth of the water line (5 feet), if the pipe is bedded in granular soil and a hydraulic gradient exists along the pipe, the granular bedding could be a potential preferred pathway for migration of CCl_4. In the same manner, other pipelines that may exist around the process building may act as potential pathways for migration if the condition of granular bedding and a flow gradient exist. The preferred pathways could be in directions different from the general groundwater flow direction.

Figures



GENERAL LOCATION MAP

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 12-13-85	FIGURE NO: 1

Woodward-Clyde Consultants

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

NOTES

STATE ROAD

WAREHOUSE

WAREHOUSE & OFFICE BUILDING

OFFICE TRAILERS

STORAGE SHED

MAINTENANCE SHOP

C.E.I. SUB-STA.

SWITCH GEAR BLDG.

BOILER HOUSE

MCC

NEW PROCESS BUILDING

FLAMMABLE DRUM STORAGE PAD

RAW WATER METER BOX

PROCESS BUILDING

AREA I

AREA II

AREA III

AREA IV

EAST PIT

WEST PIT

SUMP T-101 & T-103A

SUMP

CONTAINMENT SYSTEM

DISCHARGE MONITOR STATION

SUMP T-02 & T-03

#1 GAS WELL

BOXCAR #1

BOXCAR #2

BOXCAR #3

NH3

PIPE & WALKWAY BRIDGE

CL2

H2S

TRUCK LOADING STATION

LOADING PLATFORM

T-101

T-102

T-103

T-104

T-105

PUMP HOUSE

COOLING TOWERS

CHLORINE ROAD

UNDER ROADWAY

FLARE

STORAGE SHED

FIGURE 2 GENERAL SITE PLAN

PROVIDED BY DIAMOND SHAMROCK

REVISION DESCRIPTION

REVISION DESCRIPTION

OTHER APPROVALS

Drawn BRENNEMAN Date 4-1-85

Checked Date

Scale 1" = 40'-0" Date

Plant PAINESVILLE Dept. PROCESS ENGR.

GENERAL PLOT PLAN 2E

AS-ARBJA

REFERENCE DRAWINGS

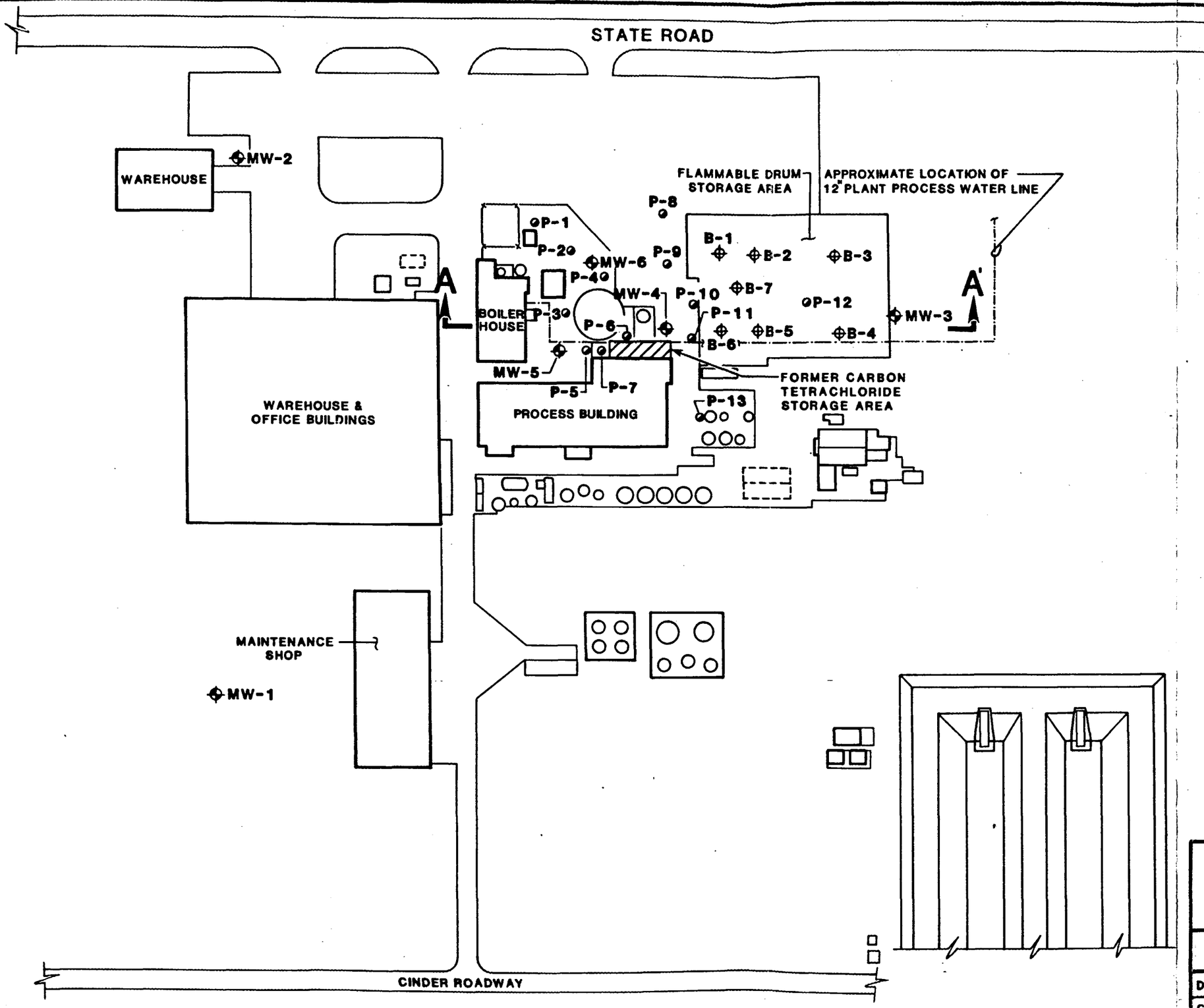
ASSOCIATE ENGINEERS

ASSOCIATE ENGINEER DWG NO AND REV.

DIAMOND SHAMROCK CORPORATION

ENGINEERING DEPARTMENT

5AS581-1 C



LEGEND

MW-1 ⊕ MONITORING WELL

B-1 ⊕ EXPLORATORY BORING

P-1 ⊙ SHALLOW SOIL BORING

LOCATION OF SECTION A-A'
REFER TO FIGURE 4

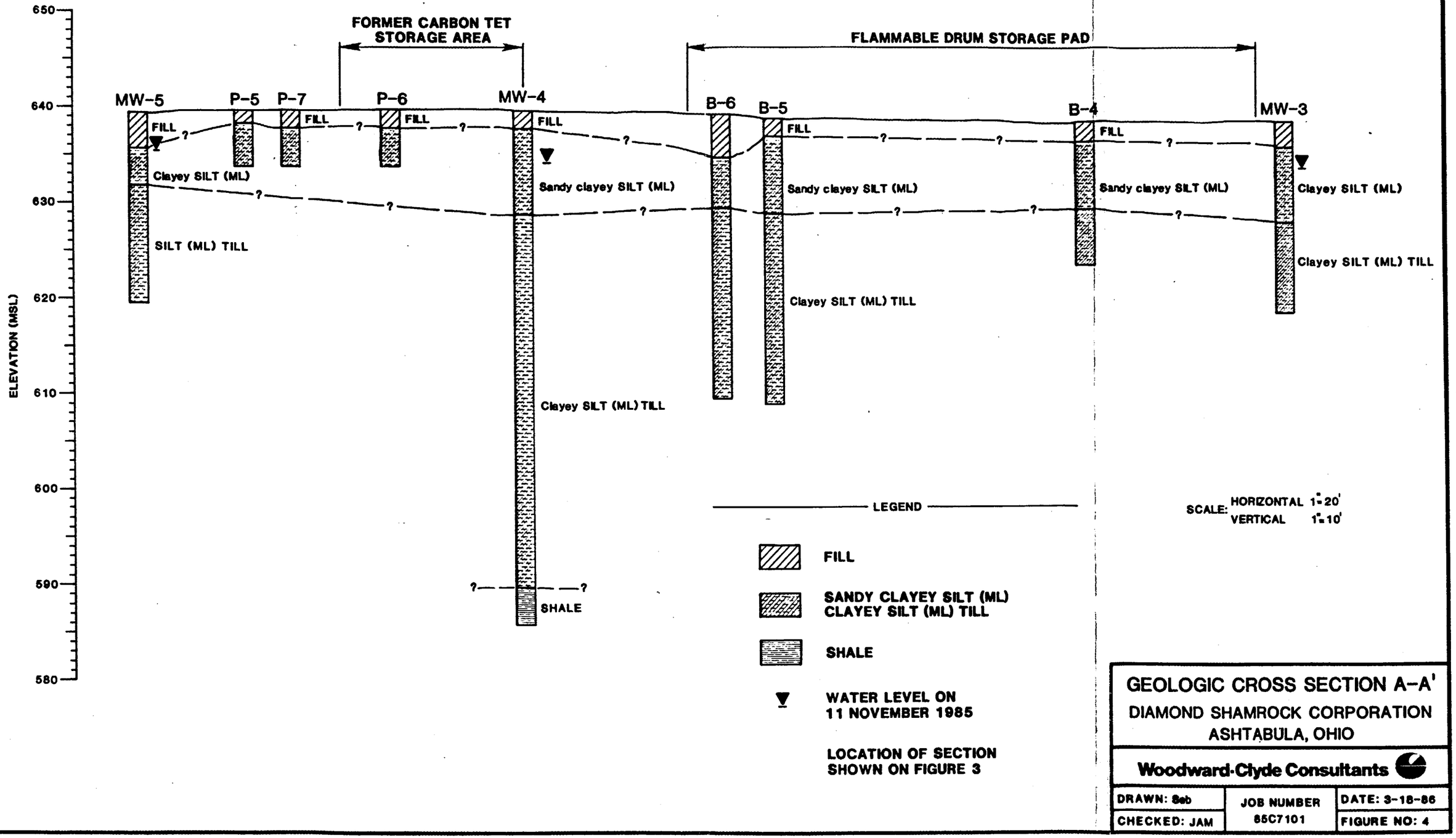
0 40 80 160

SCALE IN FEET

MONITORING WELL AND SOIL BORING LOCATIONS
DIAMOND SHAMROCK CORPORATION ASHTABULA, OHIO

Woodward-Clyde Consultants

DRAWN: REM	JOB NUMBER 85C7101	DATE: 12-9-85
CHECKED: JAM		FIGURE NO: 3

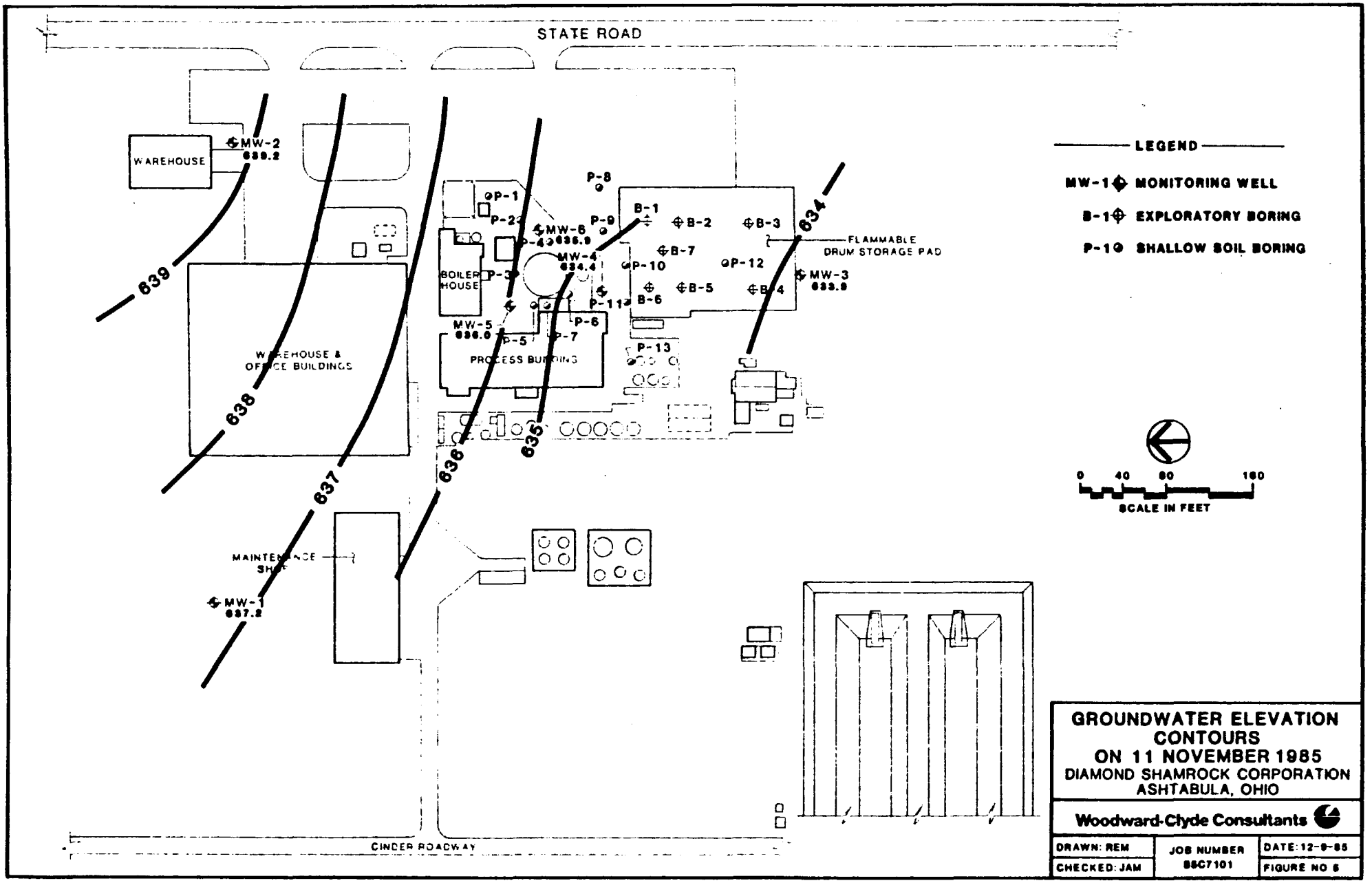


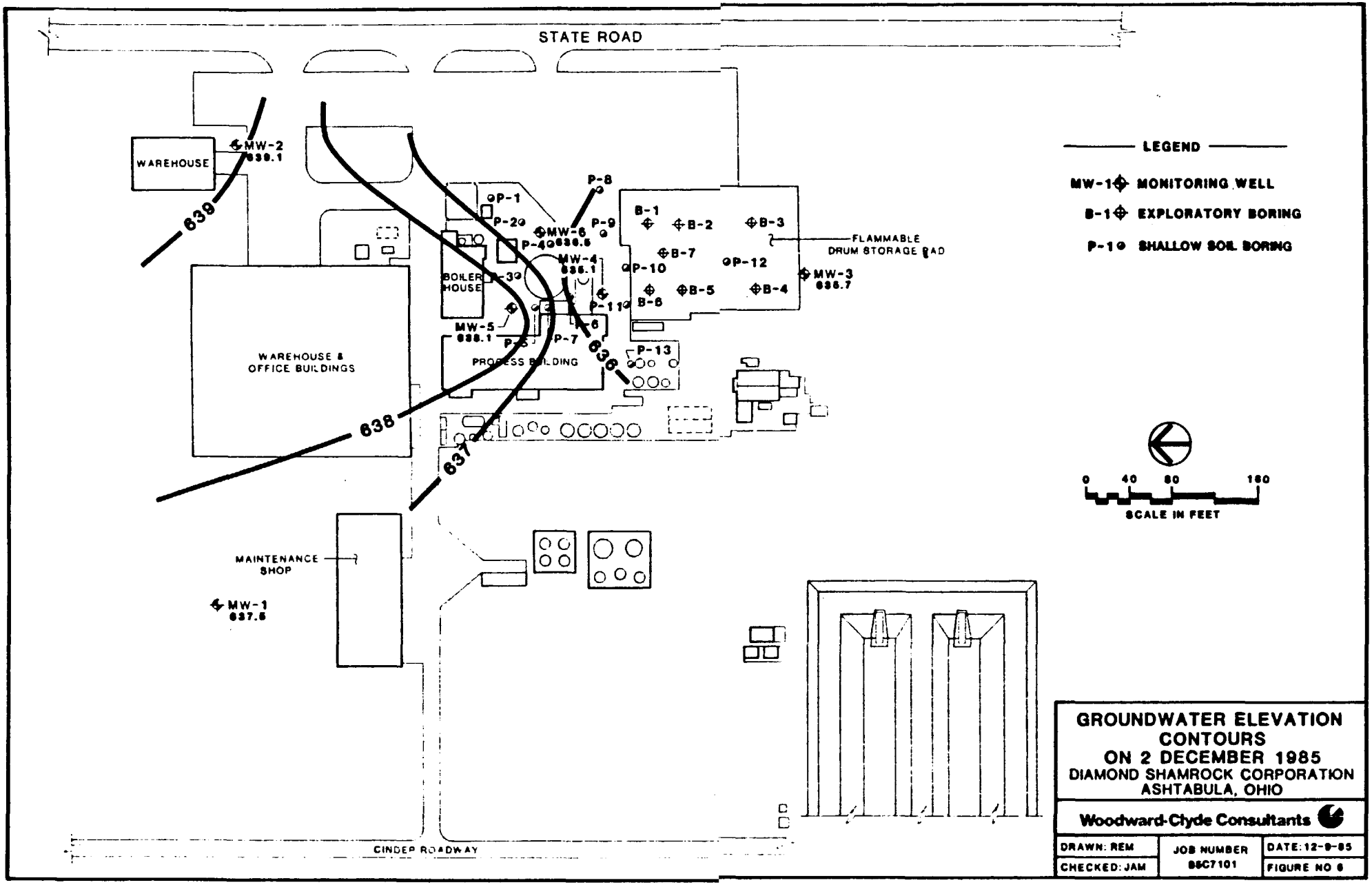
GEOLOGIC CROSS SECTION A-A'

DIAMOND SHAMROCK CORPORATION
ASHTABULA, OHIO

Woodward-Clyde Consultants

DRAWN: Seb	JOB NUMBER	DATE: 3-18-86
CHECKED: JAM	85C7101	FIGURE NO: 4

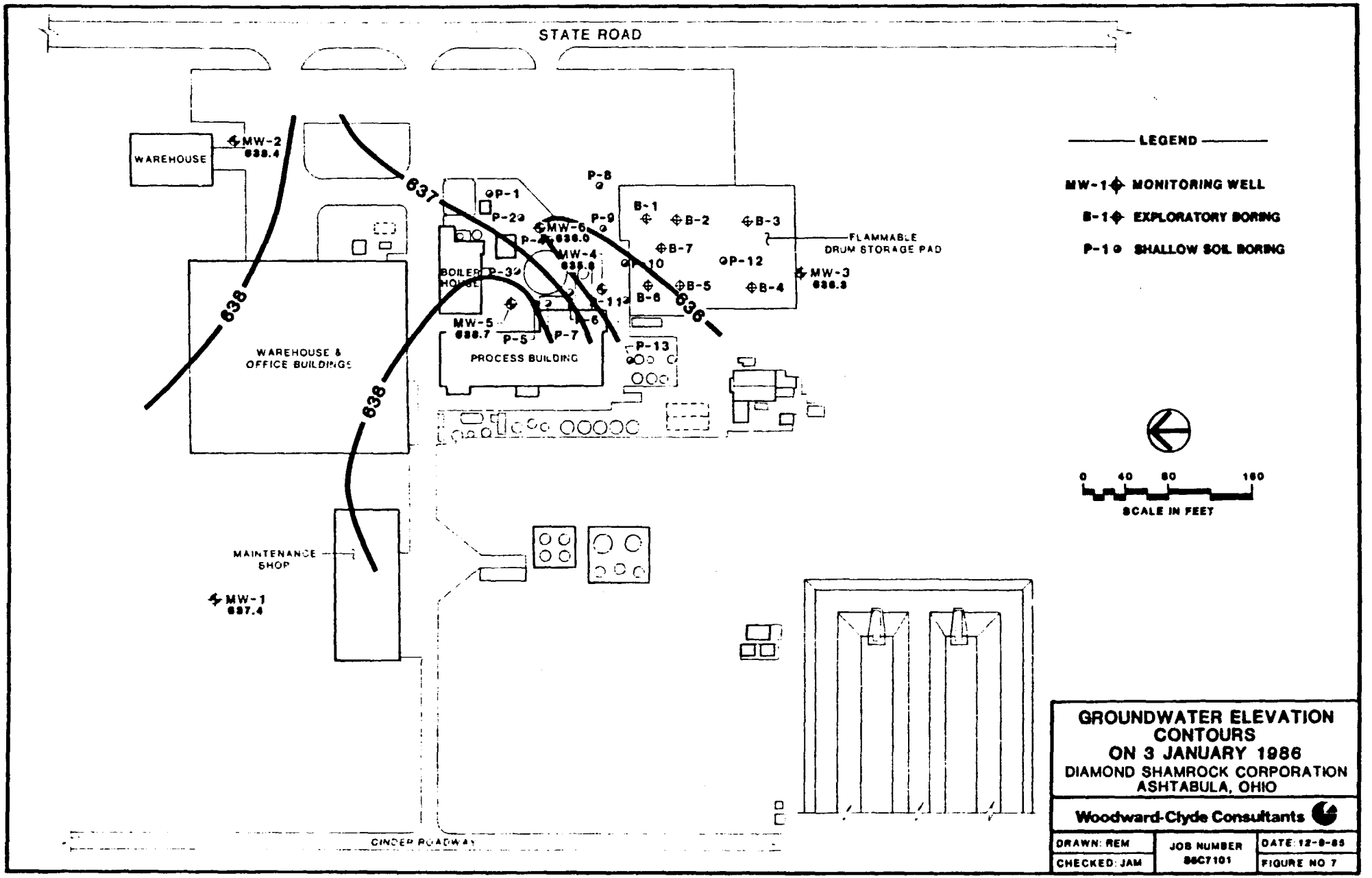

STATE ROAD
WAREHOUSE
MW-2
639.2
639
638
637
636
635
634
WAREHOUSE & OFFICE BUILDINGS
BOILER HOUSE
PROCESS BUILDING
MW-1
637.2
MW-3
633.8
MW-4
634.4
MW-5
636.0
MW-6
636.9
P-1
P-2
P-3
P-4
P-5
P-6
P-7
P-8
P-9
P-10
P-11
P-12
P-13
B-1
B-2
B-3
B-4
B-5
B-6
B-7
FLAMMABLE DRUM STORAGE PAD
MAINTENANCE SHOP
CINDER ROADWAY
LEGEND
MW-1 MONITORING WELL
B-1 EXPLORATORY BORING
P-1 SHALLOW SOIL BORING
0 40 80 160
SCALE IN FEET
GROUNDWATER ELEVATION CONTOURS
ON 11 NOVEMBER 1985
DIAMOND SHAMROCK CORPORATION
ASHTABULA, OHIO
Woodward-Clyde Consultants
DRAWN: REM
CHECKED: JAM
JOB NUMBER
86C7101
DATE: 12-9-86
FIGURE NO 6



GROUNDWATER ELEVATION CONTOURS ON 2 DECEMBER 1985
DIAMOND SHAMROCK CORPORATION
ASHTABULA, OHIO

Woodward-Clyde Consultants

DRAWN: REM	JOB NUMBER 85C7101	DATE: 12-9-85
CHECKED: JAM		FIGURE NO 6



GROUNDWATER ELEVATION CONTOURS ON 3 JANUARY 1986

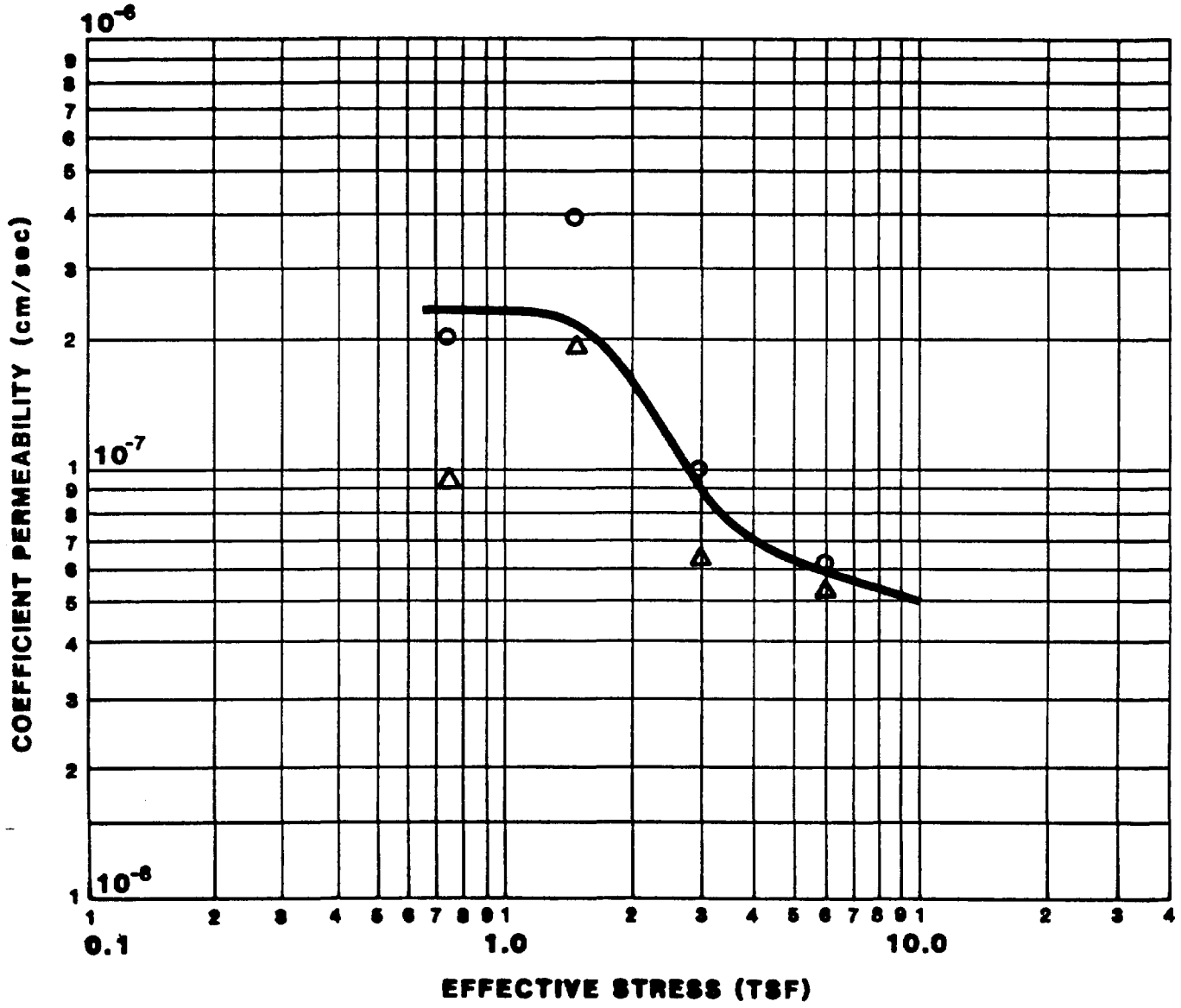
DIAMOND SHAMROCK CORPORATION
ASHTABULA, OHIO

Woodward-Clyde Consultants

DRAWN: REM	JOB NUMBER 86C7101	DATE: 12-8-86
CHECKED: JAM		FIGURE NO 7

○ BORING B-5 SAMPLE ST-1
DEPTH=12 FT.
DRY UNIT WEIGHT = 120 PCF
MOISTURE CONTENT = 15%

△ BORING B-5 SAMPLE ST-2
DEPTH=22 FT.
DRY UNIT WEIGHT=116.3 PCF
MOISTURE CONTENT=18%



COEFFICIENT OF PERMEABILITY FROM CONSOLIDATION TEST

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 2-3-86	FIGURE NO: 8

Woodward-Clyde Consultants

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Tables

TABLE 1
SUMMARY OF CHEMICAL ANALYSES
GROUNDWATER SAMPLES
DIAMOND SHAMROCK PROCESS CHEMICALS FACILITY
ASHTABULA, OHIO

	Concentration of CCl_4 (mg/l; ppm)	
Well No.	11-11-85	12-02-85
MW-1	N.D.	N.D.
MW-2	N.D.	N.D.
MW-3	2.5	1.7
MW-4	1.5	1.02
MW-5	N.D.	N.D.
MW-6	N.D.	N.D.
Field Blank	N.D.	

Notes: N.D. = None Detected
Detection Limit = 0.5 µg/liter

TABLE 2
SUMMARY OF CHEMICAL ANALYSES
SHALLOW SOIL BORING SAMPLES
DIAMOND SHAMROCK PROCESS CHEMICALS FACILITY
ASHTABULA, OHIO

Sample I.D.	Depth	Concentration of CCl_4 (mg/kg; ppm)
P-1	0 - 2 ft.	N.D.
P-1	2 - 4 ft.	N.D.
P-1	4 - 6 ft.	N.D.
P-2	0 - 2 ft.	N.D.
P-2	2 - 4 ft.	N.D.
P-2	4 - 6 ft.	N.D.
P-3	0 - 2 ft.	N.D.
P-3	2 - 4 ft.	N.D.
P-3	4 - 6 ft.	0.74
P-4	0 - 2 ft.	N.D.
P-4	2 - 4 ft.	N.D.
P-4	4 - 6 ft.	N.D.
P-5	0 - 2 ft.	N.D.
P-5	2 - 4 ft.	N.D.
P-5	4 - 6 ft.	0.77
P-6	0 - 2 ft.	0.22
P-6	2 - 4 ft.	N.D.
P-6	4 - 6 ft.	2.4
P-7	0 - 2 ft.	N.D.
P-7	2 - 4 ft.	N.D.
P-7	4 - 6 ft.	N.D.
P-8	0 - 2 ft.	N.D.
P-8	2 - 4 ft.	N.D.
P-8	4 - 6 ft.	N.D.
P-9	0 - 2 ft.	N.D.
P-9	2 - 4 ft.	N.D.
P-9	4 - 6 ft.	N.D.
P-10	0 - 2 ft.	N.D.
P-10	2 - 4 ft.	N.D.
P-10	4 - 6 ft.	N.D.
P-11	0 - 2 ft.	N.D.
P-11	2 - 4 ft.	N.D.
P-11	4 - 6 ft.	N.D.
P-12	0 - 2 ft.	N.D.
P-12	2 - 4 ft.	N.D.
P-12	4 - 6 ft.	0.61
P-13	0 - 2 ft.	N.D.
P-13	2 - 4 ft.	N.D.
P-13	4 - 6 ft.	0.98

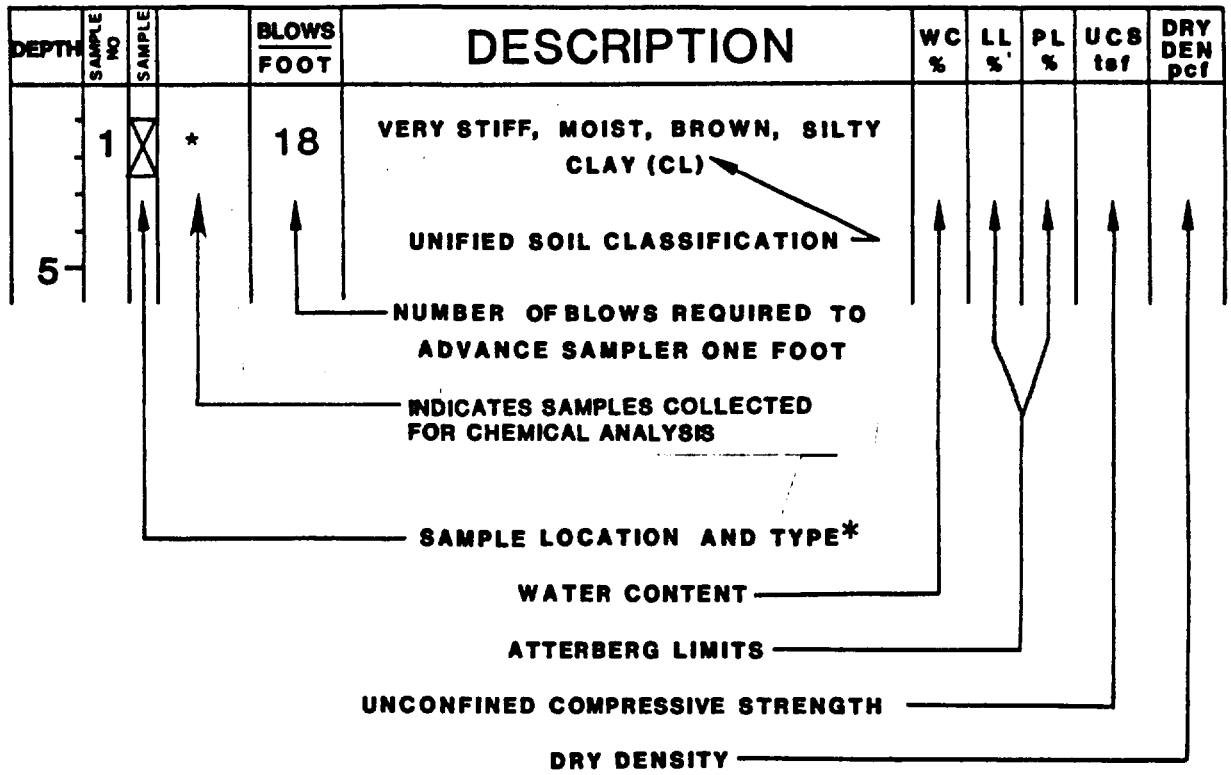
Notes: N.D. = None Detected
Dectection Limit = 0.05 mg/kg Dry Weight

TABLE 3
SUMMARY OF CHEMICAL ANALYSES
EXPLORATORY SOIL BORING SAMPLES
DIAMOND SHAMROCK PROCESS CHEMICALS FACILITY
ASHTABULA, OHIO

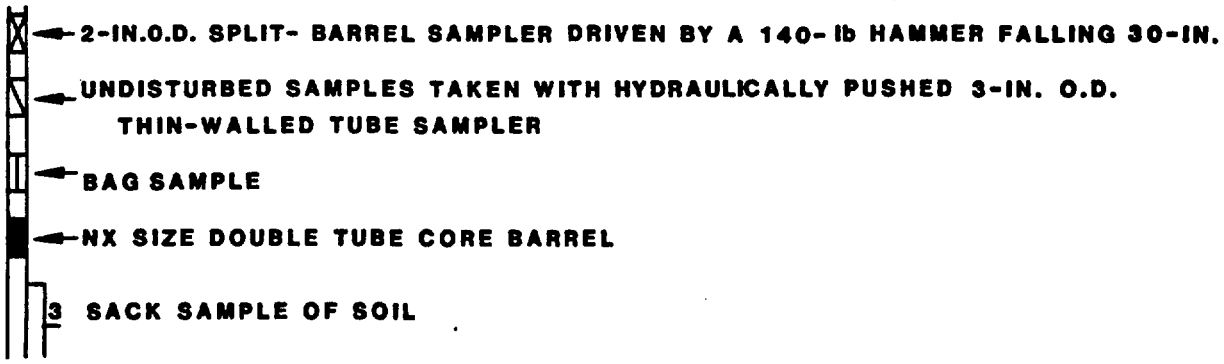
Sample I.D.	Depth	Concentration of CCl_4 (mg/kg;ppm)
MW-1	2.5 - 4.0 ft.	N.D.
MW-1	7.0 - 8.5 ft.	N.D.
MW-1	18.5 - 20.0 ft.	N.D.
MW-2	2.5 - 4.0 ft.	N.D.
MW-2	7.0 - 8.5 ft.	N.D.
MW-2	18.5 - 20.0 ft.	N.D.
MW-3	2.5 - 4.0 ft.	160
MW-3	7.0 - 8.5 ft.	200
MW-3	18.5 - 20.0 ft.	N.D.
MW-4	2.5 - 4.0 ft.	28.1
MW-4	10.0 - 11.5 ft.	N.D.
MW-4	18.5 - 20.0 ft.	N.D.
MW-4	28.5 - 30.0 ft.	0.64
MW-4	38.5 - 40.0 ft.	N.D.
MW-5	5.0 - 6.5 ft.	N.D.
MW-5	10.0 - 11.5 ft.	N.D.
MW-5	13.0 - 14.5 ft.	N.D.
MW-5	18.5 - 20.0 ft.	N.D.
MW-6	2.5 - 4.0 ft.	N.D.
MW-6	7.0 - 8.5 ft.	N.D.
MW-6	18.5 - 20.0 ft.	N.D.
B-3	6.5 - 8.5 ft.	N.D.
B-4	2.0 - 4.0 ft.	N.D.
B-5	10.5 - 12.0 ft.	N.D.
B-5	20.5 - 22.0 ft.	N.D.
B-7	5.5 - 7.5 ft.	N.D.
B-7	17.5 - 19.5 ft.	N.D.

Note: N.D. = None Detected
Detection Limit = 0.05 mg/kg Dry Weight

Appendix A



*SAMPLE IDENTIFICATION



KEY TO LOG OF BORINGS

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Seb	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 12-30-85	FIGURE NO: A-1

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION SEE FIGURE 3 | DATE DRILLED 30 October 1985

KEY TO BORING LOGS SEE FIGURE A-1 | WATER LEVEL 1.1 ft.

SURFACE ELEVATION 639.7 ft. | DATE MEASURED 3 January 1986

DEPTH	SAMPLE NO	SAMPLE		BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
	1			4	Soft, wet, brown CLAY (TOPSOIL)					
	2		*	13	Stiff, damp, brown and gray, mottled, clayey SILT (ML)					
5	3			16	. . . trace sand and rock fragments					
	4		*	21						
					Medium dense, damp, brown, fine, silty SAND (SM)					
10	5			26	Very stiff, damp, gray, sandy, clayey SILT (ML) with rock fragments					
	6			22						
15										
	7		*	38	. . . hard					
20					End of Boring at 20.0 ft.					
25										
30										

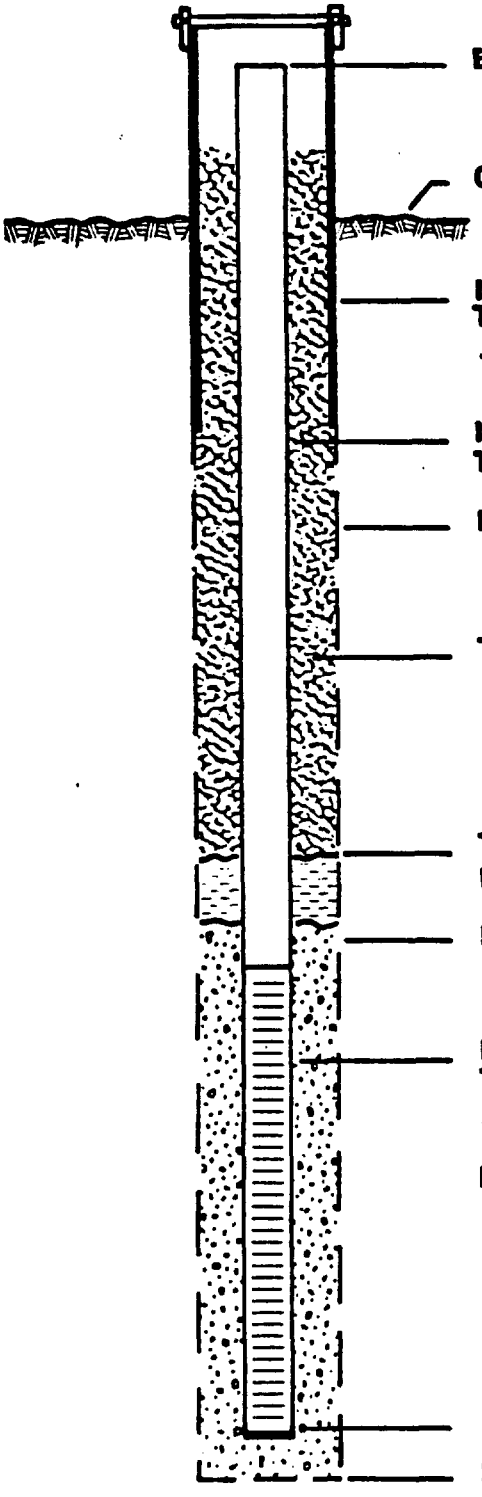
LOG OF BORING MW-1

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM | CHECKED BY: JAM | PROJECT NO: 85C7101 | DATE: 11-29-85 | FIGURE NO: A-2

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS



Elevation of top of riser pipe 640.73 ft.

Ground Elevation 639.7 ft.

I.D. of surface casing 4"
Type of surface casing STEEL WITH LOCKING CAP

I.D. of riser pipe 2"
Type of riser pipe SCH. 40 PVC

Diameter of borehole 6"

Type of backfill C-B GROUT

Type of seal BENTONITE PELLET
Depth to top of seal 5.0 ft.

Depth to top of sand pack 7.0 ft.

Depth to top of screen 9.0 ft.
Type of screened section 0.010 INCH SLOTTED PVC

I.D. of screened section 2"

Depth to bottom of well 19.5 ft.

Depth of borehole 20.0 ft.

REPORT OF MONITORING WELL MW-1

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Seb	CHECKED BY JAM	PROJECT NO: 85C7101	DATE: 12-11-85	FIGURE NO: A-3

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION SEE FIGURE 3 | DATE DRILLED 31 October 1985

KEY TO BORING LOGS SEE FIGURE A-1 | WATER LEVEL 2.2 ft.

SURFACE ELEVATION 640.6 ft. | DATE MEASURED 3 January 1986

DEPTH	SAMPLE NO	SAMPLE		BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
	1			7	Firm, damp, brown CLAY with some organics (TOPSOIL)					
	2		*	12	Stiff, damp, brown clayey SILT (ML) with rock fragments					
5	3			13						
	4		*	22	. . .becomes sandy					
10	5			24	Very stiff, damp, gray clayey SILT (ML) with rock fragments					
	6			23						
15										
	7		*	18						
20					End of Boring at 20.0 feet					
25										

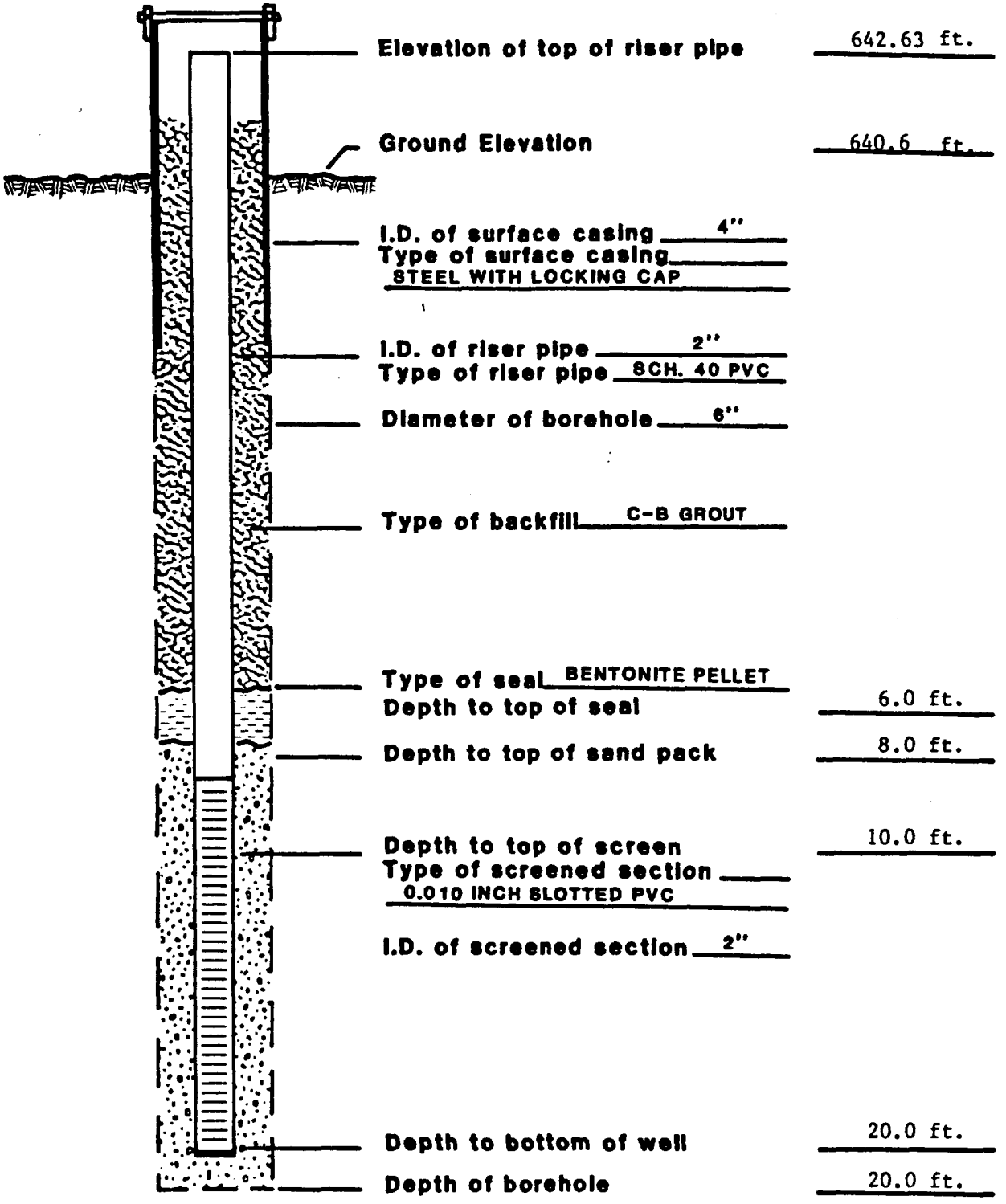
LOG OF BORING MW-2

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM | CHECKED BY: JAM | PROJECT NO: 85C7101 | DATE: 11-29-85 | FIGURE NO: A-4

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS



REPORT OF MONITORING WELL MW-2

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Bob	CHECKED BY JAM	PROJECT NO: 85C7101	DATE: 12-11-85	FIGURE NO: A-5

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION SEE FIGURE 3 | DATE DRILLED 31 October 1985

KEY TO BORING LOGS SEE FIGURE A-1 | WATER LEVEL 2.1 ft.

SURFACE ELEVATION 638.7 ft. | DATE MEASURED 3 January 1986

DEPTH	SAMPLE NO	SAMPLE		BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
	1	X		11	Stiff, damp, sand and gravel with CLAY (FILL)					
	2	X	*	12	Stiff, damp, brown and gray mottled clayey SILT (ML)					
5	3	X		13	. . .moist					
	4	X	*	20	. . .sand seams					
10	5	X		14	Stiff, moist, gray clayey SILT (ML) with trace rock fragments					
	6	X		12						
15										
	7	X	*	15						
20					End of Boring 20.0 feet					
25										

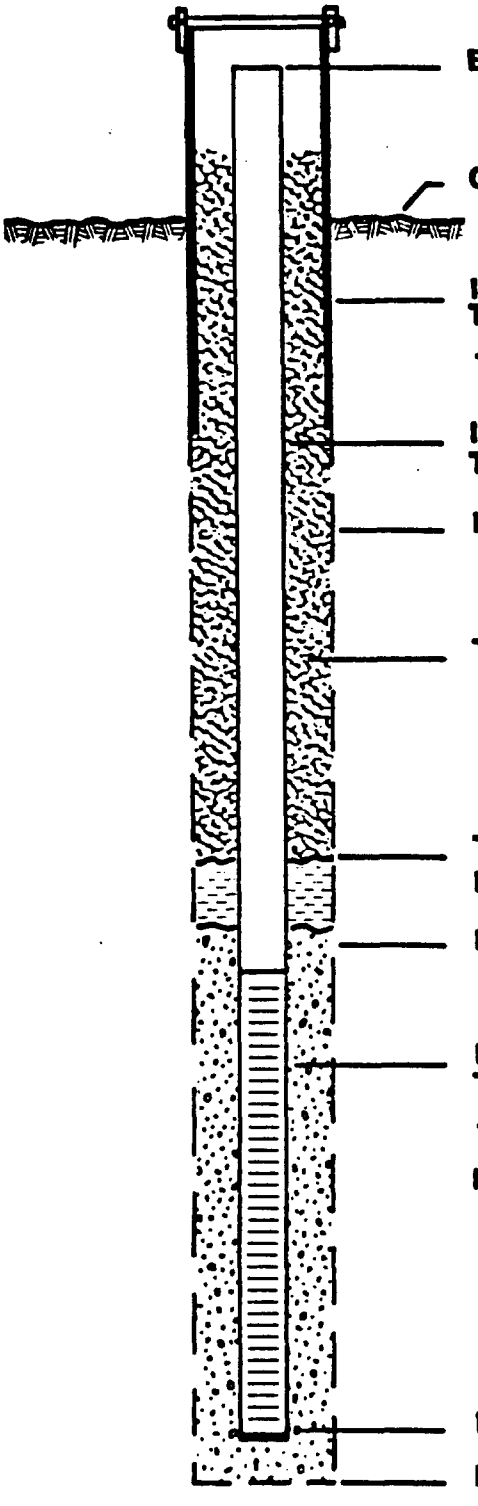
LOG OF BORING MW-3

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 11-29-85	FIGURE NO: A-6

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS



Elevation of top of riser pipe 640.11 ft.

Ground Elevation 638.7 ft.

I.D. of surface casing 4"
Type of surface casing STEEL WITH LOCKING CAP

I.D. of riser pipe 2"
Type of riser pipe SCH. 40 PVC

Diameter of borehole 6"

Type of backfill C-B GROUT

Type of seal BENTONITE PELLET
Depth to top of seal 4.0 ft.

Depth to top of sand pack 6.0 ft.

Depth to top of screen 10.0 ft.
Type of screened section 0.010 INCH SLOTTED PVC

I.D. of screened section 2"

Depth to bottom of well 20.0 ft.

Depth of borehole 20.0 ft.

REPORT OF MONITORING WELL MW-3

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Seb	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 12-11-85	FIGURE NO: A-7

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION SEE FIGURE 3 | DATE DRILLED 4 November 1985

KEY TO BORING LOGS SEE FIGURE A-1 | WATER LEVEL 3.9 ft.

SURFACE ELEVATION 639.7 ft. | DATE MEASURED 3 January 1986

DEPTH	SAMPLE NO	SAMPLE		BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
	1	X		20	Sand, gravel and rock fragments (FILL)					
	2	X	*	14	Stiff, damp, brown and gray mottled, sandy,clayey SILT (ML)					
5	3	X		14						
	4	X		28	. . .brown					
10	5	X	*	22						
					Stiff to very stiff, damp, gray clayey SILT (ML) with rock fragments					
	6	X		14						
15										
	7	X	*	29						
20										
	8	X		14						
25										
	9	X	*	24						
30										
	10	X		20						
35										
	11	X	*	36	. . .hard					
40					-CONTINUED-					

LOG OF BORING MW-4

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 11-29-85	FIGURE NO: A-8

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION SEE FIGURE 3 | DATE DRILLED 4 November 1985

KEY TO BORING LOGS SEE FIGURE A-1 | WATER LEVEL

SURFACE ELEVATION | DATE MEASURED

DEPTH	SAMPLE NO	SAMPLE	BLOWS / FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
45			76	. . . fine sand layers					
			45						
50				gray SHALE					
	12		105/.2						
55				End of Boring 53.9 feet					

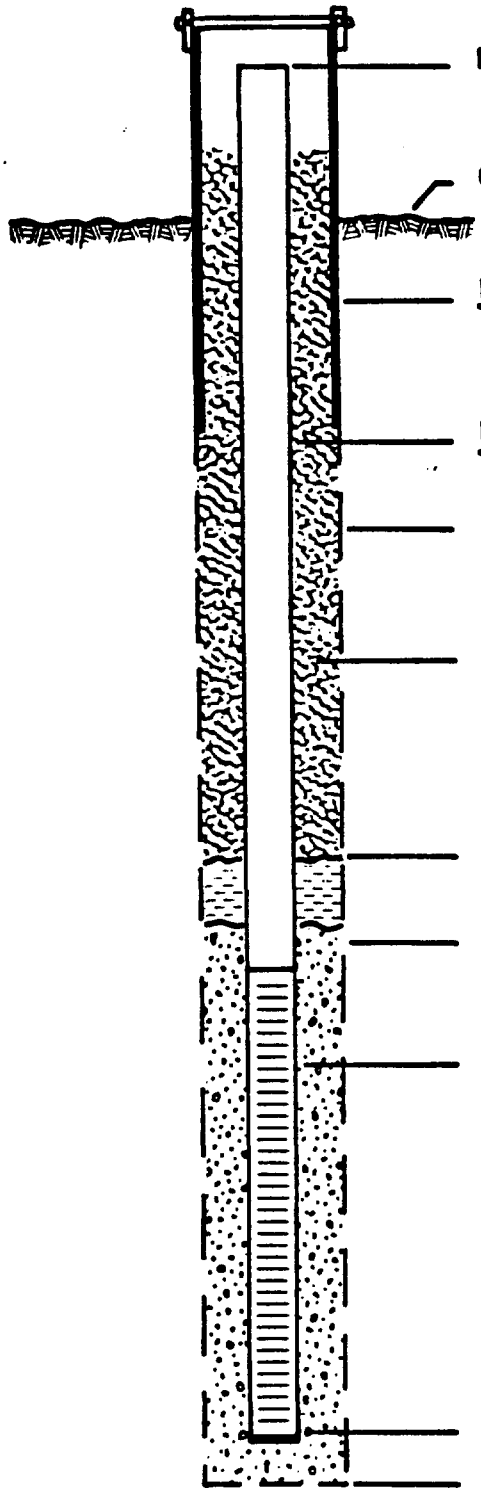
LOG OF BORING MW-4

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 11-29-85	FIGURE NO: A-8A

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS



Elevation of top of riser pipe — 643.17 ft.

Ground Elevation — 639.7 ft.

I.D. of surface casing — 4"
Type of surface casing — STEEL WITH LOCKING CAP

I.D. of riser pipe — 2"
Type of riser pipe — SCH. 40 PVC

Diameter of borehole — 6"

Type of backfill — C-B GROUT

Type of seal — BENTONITE PELLET
Depth to top of seal — 32.0 ft.

Depth to top of sand pack — 34.0 ft.

Depth to top of screen — 44.0 ft.
Type of screened section — 0.010 INCH SLOTTED PVC

I.D. of screened section — 2"

Depth to bottom of well — 54.0 ft.

Depth of borehole — 54.0 ft.

REPORT OF MONITORING WELL MW-4

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Seb	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 12-11-85	FIGURE NO: A-9

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION SEE FIGURE 3 | DATE DRILLED 1 November 1985

KEY TO BORING LOGS SEE FIGURE A-1 | WATER LEVEL 0.5 ft.

SURFACE ELEVATION 639.2 ft. | DATE MEASURED 3 January 1986

DEPTH	SAMPLE NO	SAMPLE		BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
	1	X		15	Stiff, sand, gravel, rock fragments (FILL)					
	2	X		10						
5	3	X	*	14	Stiff, damp, brown, clayey SILT (ML)					
	4	X		22						
10	5	X	*	18	Very stiff, damp, gray SILT (ML) with rock fragments					
	6	X	*	15						
15										
	7	X	*	18						
20					End of Boring at 20.0 ft.					
25										
30										

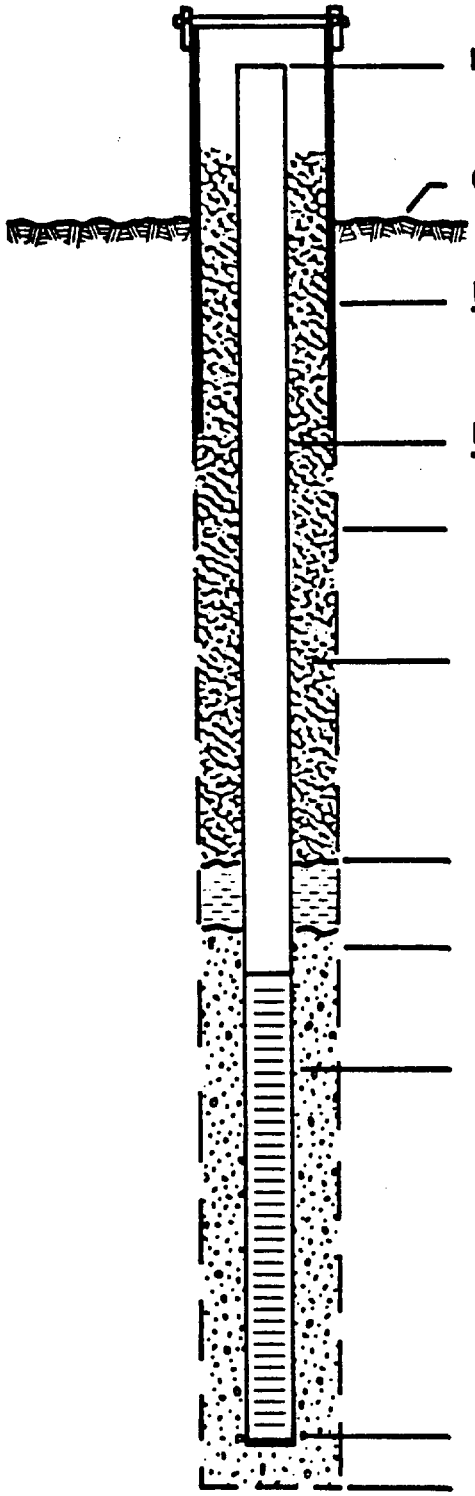
LOG OF BORING MW-5

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 11-29-85	FIGURE NO: A-10

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS



Elevation of top of riser pipe 641.65 ft.

Ground Elevation 639.2 ft.

I.D. of surface casing 4"
Type of surface casing STEEL WITH LOCKING CAP

I.D. of riser pipe 2"
Type of riser pipe SCH. 40 PVC

Diameter of borehole 6"

Type of backfill C-B GROUT

Type of seal BENTONITE PELLET
Depth to top of seal 5.5 ft.

Depth to top of sand pack 7.5 ft.

Depth to top of screen 9.5 ft.
Type of screened section 0.010 INCH SLOTTED PVC

I.D. of screened section 2"

Depth to bottom of well 19.5 ft.

Depth of borehole 20.0 ft.

REPORT OF MONITORING WELL MW-5

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Bob	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 12-11-86	FIGURE NO: A-11

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION SEE FIGURE 3 | DATE DRILLED 31 October 1985

KEY TO BORING LOGS SEE FIGURE A-1 | WATER LEVEL 3.7 ft.

SURFACE ELEVATION 639.7 ft. | DATE MEASURED 3 January 1986

DEPTH	SAMPLE NO	SAMPLE		BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
	1	X		9	Stiff, brown CLAY with gravel, sand, rock fragments (FILL)					
					Stiff, damp, mottled gray and brown CLAY (CL) with rock fragments					
	2	X	*	6	Firm, damp to moist, mottled gray and brown, sandy, clayey SILT (ML)					
5	3	X		9						
	4	X	*	17	Very stiff, damp, brown, clayey SILT (ML) with rock fragments					
10	5	X		19	. . . sandy, wet					
					. . . gray					
	6	X		18						
15										
	7	X	*	18	. . . trace black shale fragments and organics					
20					End of Boring at 20.0 ft.					
25										
30										

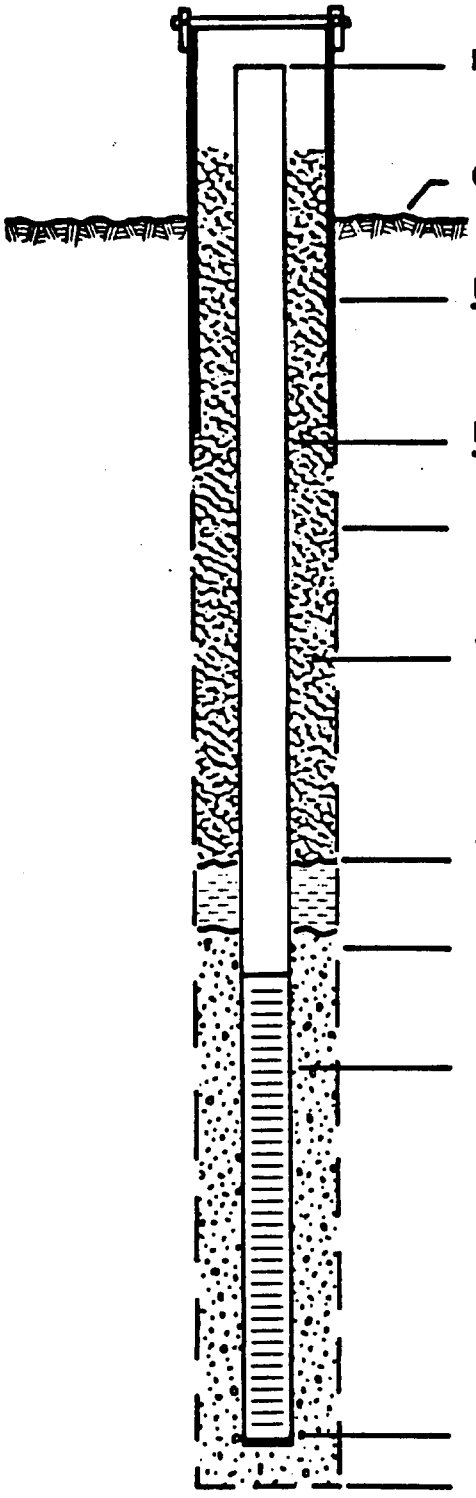
LOG OF BORING MW-6

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM | CHECKED BY: JAM | PROJECT NO: 85C7101 | DATE: 11-29-85 | FIGURE NO: A-12

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS



Elevation of top of riser pipe — 642.54 ft.

Ground Elevation — 639.7 ft.

I.D. of surface casing — 4"

Type of surface casing — STEEL WITH LOCKING CAP

I.D. of riser pipe — 2"

Type of riser pipe — SCH. 40 PVC

Diameter of borehole — 6"

Type of backfill — C-B GROUT

Type of seal — BENTONITE PELLET

Depth to top of seal — 6.0 ft.

Depth to top of sand pack — 8.0 ft.

Depth to top of screen — 10.0 ft.

Type of screened section — 0.010 INCH SLOTTED PVC

I.D. of screened section — 2"

Depth to bottom of well — 20.0 ft.

Depth of borehole — 20.0 ft.

REPORT OF MONITORING WELL MW-6

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Seb	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 12-11-86	FIGURE NO: A-13

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION See Figure 3 | DATE DRILLED 6 November 1985

KEY TO BORING LOGS See Figure A-1 | WATER LEVEL None Encountered

SURFACE ELEVATION | DATE MEASURED

DEPTH	SAMPLE NO	SAMPLE	BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
0	1			Sand, gravel, rock fragments (FILL)					
2	2		11	Stiff, damp, dark green and gray, sandy SILT (ML) with rock fragments, organics . . . mottled brown and gray, iron staining					
4	3		16						
6				End of Boring at 6.0 ft.					

LOG OF BORING P-1

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Seb	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 12-30-85	FIGURE NO: A-14

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION See Figure 3 | DATE DRILLED 6 November 1985

KEY TO BORING LOGS See Figure A-1 | WATER LEVEL None Encountered

SURFACE ELEVATION | DATE MEASURED

DEPTH	SAMPLE NO	SAMPLE	BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCB tsf	DRY DEN pcf
1	1		28	Sand, gravel, cinders, rock fragments (FILL)					
2									
3	2		11	Stiff, damp, dark gray and brown, clayey SILT (ML) with rock fragments, organics					
4									
5	3		10	Loose, moist to wet, brown, silty SAND (SM)					
6				End of Boring at 6.0 ft.					
7									

LOG OF BORING P-2

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Bob | CHECKED BY: JAM | PROJECT NO: 85C7101 | DATE: 12-30-85 | FIGURE NO: A-15

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION See Figure 3 | DATE DRILLED 1 November 1985

KEY TO BORING LOGS See Figure A-1 | WATER LEVEL None encountered

SURFACE ELEVATION | DATE MEASURED

DEPTH	SAMPLE NO	SAMPLE	BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
1	1		12	Gravel, rock fragments (FILL)					
2				. . . wood chunk					
3	2		6	Firm, moist to wet, mottled brown and gray, clayey SILT (ML)					
4									
5	3		10	. . . stiff with black oily material on outside of sample					
6				End of Boring at 6.0 ft.					
7									

LOG OF BORING P-3

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Seb	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 12-30-85	FIGURE NO: A-16

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION See Figure 3 | DATE DRILLED 5 November 1985

KEY TO BORING LOGS See Figure A-1 | WATER LEVEL None encountered

SURFACE ELEVATION | DATE MEASURED

DEPTH	SAMPLE NO	SAMPLE	BLOWS / FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
1	1		13	Stiff, sand, gravel, rock fragments (FILL)					
2									
3	2		9	Stiff, damp, dark gray, sandy, clayey SILT (ML), rock fragments, organics					
4									
5	3		22	Stiff, damp to moist, mottled, brown and gray, sandy, clayey SILT (ML) with rock fragments . . . very stiff, brown					
6				End of Boring at 6.0 ft.					
7									

LOG OF BORING P-4

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Seb	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 12-30-85	FIGURE NO: A-17

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION See Figure 3 | DATE DRILLED 1 November 1985

KEY TO BORING LOGS See Figure A-1 | WATER LEVEL None

SURFACE ELEVATION | DATE MEASURED

DEPTH	SAMPLE NO	SAMPLE	BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
1	1		26	Concrete fragments, sand, brick gravel (FILL)					
2	2		7	Stiff, damp, mottled, brown and gray, clayey SILT (ML) with rock fragments					
4	3			. . . alternating brown clay and gray silt layers, trace sand					
6				End of Boring at 6.0 ft.					
7									

LOG OF BORING P-5

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Seb | CHECKED BY: JAM | PROJECT NO: 85C7101 | DATE: 12-30-85 | FIGURE NO: A-17

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION See Figure 3 | DATE DRILLED 5 November 1985

KEY TO BORING LOGS See Figure A-1 | WATER LEVEL None encountered

SURFACE ELEVATION | DATE MEASURED

DEPTH	SAMPLE NO	SAMPLE	BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
1	1		22	Sand, gravel, rock fragments (FILL)					
2				Stiff, damp, light and dark gray, clayey					
3	2		14	SILT (ML), rock fragments, organics					
4									
5	3		13	. . . brown, increasing sand content					
6				End of Boring at 6.0 ft.					
7									

LOG OF BORING P-6

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Seb	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 12-30-85	FIGURE NO: A-18

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION See Figure | DATE DRILLED 5 November 1985

KEY TO BORING LOGS See Figure A-1 | WATER LEVEL None encountered

SURFACE ELEVATION | DATE MEASURED

DEPTH	SAMPLE NO	SAMPLE	BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
1	1		9	7" Concrete Sand, gravel, brick (FILL);					
2									
3	2		14	Stiff, damp, mottled, brown and gray, clayey SILT (ML) with rock fragments					
4									
5	3		22	. . . very stiff, brown					
6				End of Boring at 6.0 ft.					
7									

LOG OF BORING P-7

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Seb | CHECKED BY: JAM | PROJECT NO: 85C7101 | DATE: 12-30-85 | FIGURE NO: A-19

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION See Figure 3 | DATE DRILLED 5 November 1985

KEY TO BORING LOGS See Figure A-1 | WATER LEVEL None Encountered

SURFACE ELEVATION | DATE MEASURED

DEPTH	SAMPLE NO	SAMPLE	BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
1	1		20	6" Asphaltic Concrete Sand, gravel, brick (FILL)					
2				Very stiff, black, clayey SILT (ML) with root fragments, rock fragments					
3	2		12	Stiff, damp to moist, mottled, brown and gray, clayey SILT (ML) with rock fragments					
5	3		15	. . . trace sand					
6				End of Boring at 6.0 ft.					
7									

LOG OF BORING P-8

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Seb	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 12-30-85	FIGURE NO: A-20

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION See Figure 3 | DATE DRILLED 5 November 1985

KEY TO BORING LOGS See Figure A-1 | WATER LEVEL None encountered

SURFACE ELEVATION | DATE MEASURED

DEPTH	SAMPLE NO	SAMPLE	BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
1	1		32	Sand, gravel, brick, cinders (FILL) . . . dark, clayey matrix					
2				Stiff, damp, mottled, brown and gray, clayey SILT (ML) with rock fragments					
3	2		12						
4									
5	3		17	. . . very stiff					
6				End of Boring at 6.0 ft.					
7									

LOG OF BORING P-9

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Seb	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 12-30-85	FIGURE NO: A-21

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION See Figure 3 | DATE DRILLED 5 November 1985

KEY TO BORING LOGS See Figure A-1 | WATER LEVEL None encountered

SURFACE ELEVATION | DATE MEASURED

DEPTH	SAMPLE NO	SAMPLE	BLOWS / FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
1	1			6" Asphaltic Concrete Sand, gravel, cinders, rock fragments (FILL) . . . clay matrix with dark, oily material					
2									
3	2			Stiff, damp, mottled, brown and gray, sandy, clayey SILT (ML)					
4									
5	3								
6				End of Boring at 6.0 ft.					
7									

LOG OF BORING P-10

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Sob | CHECKED BY: JAM | PROJECT NO: 85C7101 | DATE: 12-30-85 | FIGURE NO: A-22

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION See Figure 3 | DATE DRILLED 5 November 1985

KEY TO BORING LOGS See Figure A-1 | WATER LEVEL None encountered

SURFACE ELEVATION | DATE MEASURED

DEPTH	SAMPLE NO	SAMPLE	BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
1	1		60	4" Asphaltic Concrete Cinders, gravel, sand (FILL)					
2				Stiff, damp, mottled, brown and gray, clayey, SILT (ML) with rock fragments, iron staining					
3	2		15						
4									
5	3		11	. . . brown					
6				End of Boring at 6.0 ft.					
7									

LOG OF BORING P-11

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Seb | CHECKED BY: JAM | PROJECT NO: 85C7101 | DATE: 12-30-85 | FIGURE NO: A-23

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION See Figure 3 | DATE DRILLED 5 November 1985

KEY TO BORING LOGS See Figure A-1 | WATER LEVEL None Encountered

SURFACE ELEVATION | DATE MEASURED

DEPTH	SAMPLE NO	SAMPLE	BLOWS / FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
1	1		16	7" Concrete Sand, gravel, cinders (FILL)					
2									
3	2			Stiff, damp, mottled, brown and gray, clayey SILT (ML)					
4									
5	3			. . . brown					
6									
7				End of Boring at 6.0 ft.					

LOG OF BORING P-12

DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Seb | CHECKED BY: JAM | PROJECT NO: 85C7101 | DATE: 12-30-85 | FIGURE NO: A-24

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION See Figure 3 | DATE DRILLED 5 November 1985

KEY TO BORING LOGS See Figure A-1 | WATER LEVEL None Encountered

SURFACE ELEVATION | DATE MEASURED

DEPTH	SAMPLE NO	SAMPLE	BLOWS / FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
1	1		21	Sand, gravel, rock fragments (FILL)					
2				Very stiff, damp, mottled, brown and dark gray, clayey SILT (ML)					
3	2		19	. . . trace black material					
4									
5	3			. . . trace sand					
6									
7				End of Boring at 6.0 ft.					

LOG OF BORING P-13

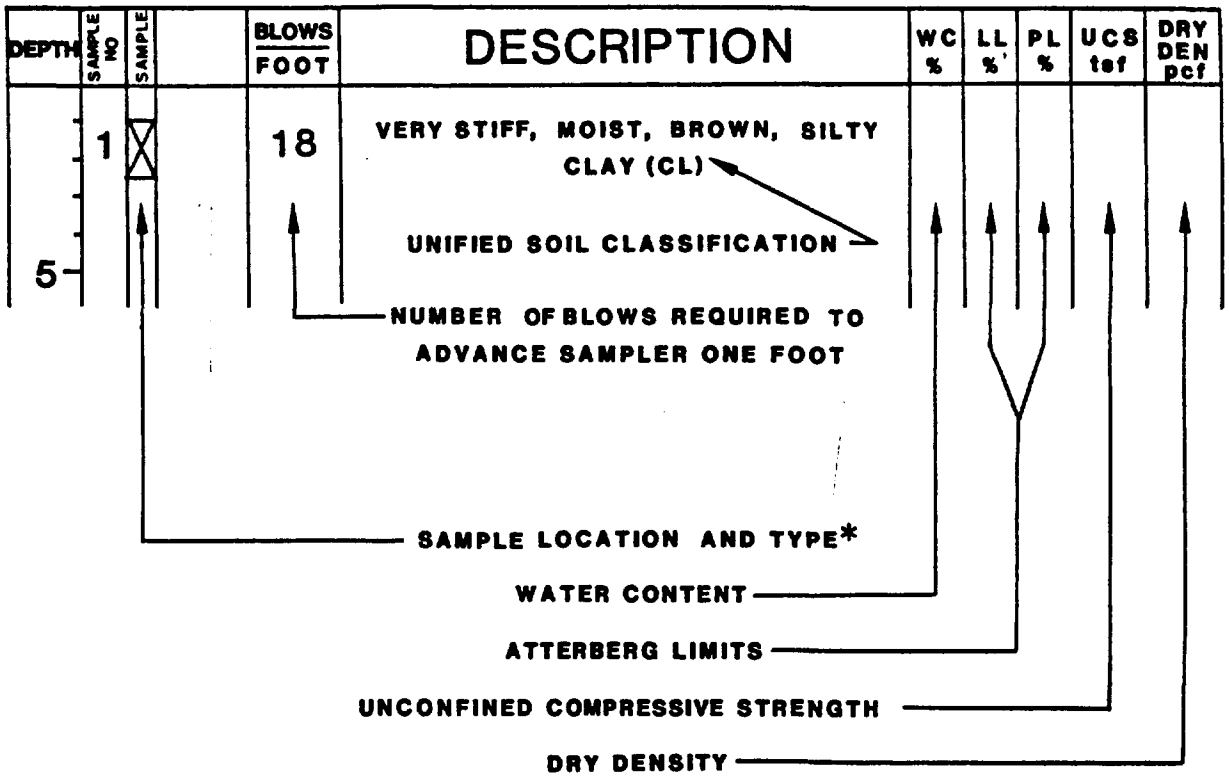
DIAMOND SHAMROCK CORPORATION-ASHTABULA, OHIO

DRAWN BY: Seb | CHECKED BY: JAM | PROJECT NO: 85C7101 | DATE: 12-30-85 | FIGURE NO: A-25

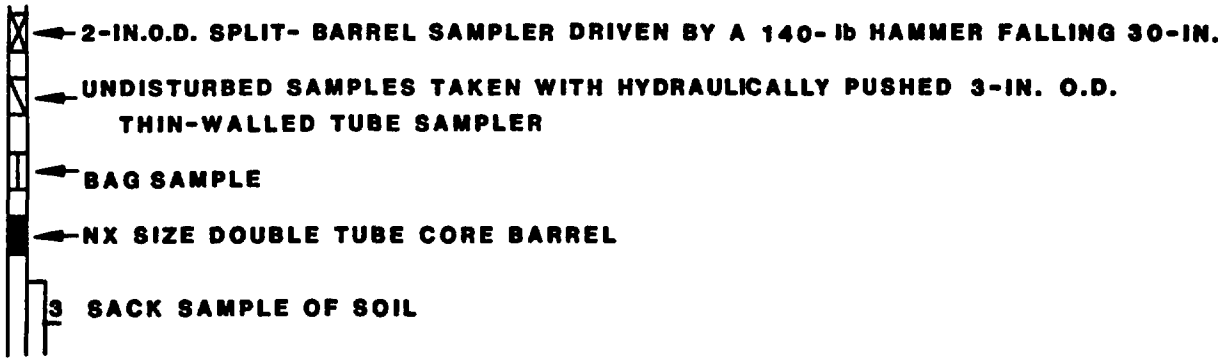
WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Appendix B



*SAMPLE IDENTIFICATION



NP NON PLASTIC

KEY TO LOG OF BORINGS

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM	CHECKED BY: JAM	PROJECT NO: 85C7010	DATE: 12-12-85	FIGURE NO: B-1

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION SEE FIGURE 3 | DATE DRILLED 8 November 1985

KEY TO BORING LOGS SEE FIGURE B-1 | WATER LEVEL Encountered at 17'

SURFACE ELEVATION 639.7 ft. | DATE MEASURED During drilling

DEPTH	SAMPLE NO	SAMPLE	BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
	1		9	7" Concrete Oily, black sand, gravel, cinders, rock fragments (FILL)					
				Medium dense, moist, brown, silty, fine SAND (SM), rock fragments					
5	2		9		13				
10	3		15						
	4		12		17				
15				Stiff, damp, gray, clayey SILT (ML) with trace rock fragments					
20	5		16	. . . very stiff, 4" sand layer	16				
25	6		21	. . . moist to wet, with sand layers	17				
30	7		23						
				End of Boring at 30.0 ft.					

LOG OF BORING B-1

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 11-29-85	FIGURE NO: B-2

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION SEE FIGURE 3 | DATE DRILLED 8 November 1985

KEY TO BORING LOGS SEE FIGURE B-1 | WATER LEVEL None encountered

SURFACE ELEVATION 639.4 ft. | DATE MEASURED

DEPTH	SAMPLE NO	SAMPLE	BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
	1	X	4	7" Concrete					
				Sand, gravel, brick, cinders (FILL)					
	2	X	10	Stiff, moist to wet, green, gray, sandy, clayey SILT (ML)	24				
5									
	3	X	18	. . . mottled brown and gray	16				
10				Very stiff, damp, gray SILT (ML) with rock fragments					
	4	X	18		21				
15									
				Stiff, moist, gray, clayey SILT (ML)					
	5	X	14	. . . stiff, moist	18				
20									
	6	X	13		19				
25									
				Very stiff, damp, gray, fine, sandy, clayey SILT (ML)					
	7	X	18		24				
30				End of Boring at 30.0 ft.					

LOG OF BORING B-2

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 11-29-85	FIGURE NO: B-3

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION SEE FIGURE 3 | DATE DRILLED 7 November 1985

KEY TO BORING LOGS SEE FIGURE B-1 | WATER LEVEL None encountered

SURFACE ELEVATION 639.3 ft. | DATE MEASURED

DEPTH	SAMPLE NO	SAMPLE	BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
	1		8	7" Concrete Loose sand, gravel, cinders (FILL)					
5	2		10	Stiff, damp to moist, mottled, brown and gray, sandy SILT (ML)	22				
	ST				16		NP	1.2	110
	3		28						
10				Very stiff, damp, gray, clayey SILT (ML)	19				
	4		15		15				
15				End of Boring at 15.0 Ft.					
20									
25									
30									

LOG OF BORING B-3

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 11-29-85	FIGURE NO: B-4

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION SEE FIGURE 3 | DATE DRILLED 7 November 1985

KEY TO BORING LOGS SEE FIGURE B-1 | WATER LEVEL Encountered at 10 ft

SURFACE ELEVATION 638.8 ft. | DATE MEASURED During drilling

DEPTH	SAMPLE NO	SAMPLE	BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
	1		8	7" Concrete					
				Sand, gravel, rock frag. in clay matrix (FILL)	20				
	ST			Firm, moist to wet, mottled brown and gray, sandy SILT (ML)	26		NP	0.6	97
5	2		6		28				
	3		17						
10				Very stiff, wet, gray SILT (ML) with rock fragments	18				
	4		20		18				
15				End of Boring at 15.0 ft.					
20									
25									
30									

LOG OF BORING B-4

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM	CHECKED BY: JAM	PROJECT NO: 86C7101	DATE: 11-29-86	FIGURE NO: B-5

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION SEE FIGURE 3 | DATE DRILLED 9 November 1985

KEY TO BORING LOGS SEE FIGURE B-1 | WATER LEVEL Encountered at 10 ft.

SURFACE ELEVATION 639.0 ft. | DATE MEASURED During drilling

DEPTH	SAMPLE NO	SAMPLE	BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
	1		8	7" Concrete Sand, gravel, brick (FILL)					
	2		12	Stiff, damp to moist, mottled, brown and gray sandy, clayey SILT (ML) with rock fragments	20				
5									
	3		28	. . . very stiff with brown staining					
10	ST			Very stiff, damp, gray, clayey SILT (ML) with rock fragments	15	24	21	3.4	120
	4		16						
15									
	5		19						
20	ST				18	27	20	3.1	114
	6		17		21				
25									
	7		23	. . . sandy	23				
30				End of Boring at 30.0 ft.					

LOG OF BORING B-5

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 11-29-85	FIGURE NO: B-6

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION SEE FIGURE 3 | DATE DRILLED 8 November 1985

KEY TO BORING LOGS SEE FIGURE B-1 | WATER LEVEL Encountered at 15 ft

SURFACE ELEVATION 639.4 ft. | DATE MEASURED During drilling

SAMPLE NO	SAMPLE	BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
1	X	12	7" Concrete Sand, gravel, cinders, brick (FILL)					
2	X	8		23				
			Firm, moist, mottled, brown and gray, sandy clayey SILT (ML)					
3	X	21		19				
			Very stiff, damp, gray, clayey SILT (ML) with rock fragments					
4	X	16		16				
5	X	22		19				
			Stiff, moist, gray, clayey SILT (ML)					
6	X	14		25				
7	X	23	. . . very stiff, wet	26				
			End of Boring at 30.0 ft.					

LOG OF BORING B-6

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 11-29-85	FIGURE NO: B-7

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOCATION SEE FIGURE 3 | DATE DRILLED 9 November 1985

KEY TO BORING LOGS SEE FIGURE B-1 | WATER LEVEL Encountered at 17 ft

SURFACE ELEVATION 639.5 ft. | DATE MEASURED During drilling

DEPTH	SAMPLE NO	SAMPLE	BLOWS/FOOT	DESCRIPTION	WC %	LL %	PL %	UCS tsf	DRY DEN pcf
	1		8	7" Concrete Sand, gravel, cinders (FILL)					
				Very stiff, damp, mottled, brown and gray, clayey SILT (ML)					
5	2		16						
	ST				19		NP	1.9	108
	3		16		14				
10									
	4		15	. . . gray, sandy	16				
15									
	ST				14	29	25	1.2	110
20									
	6		15						
25									
	7		16	. . . wet	24				
30				End of Boring at 30.0 ft.					

LOG OF BORING B-7

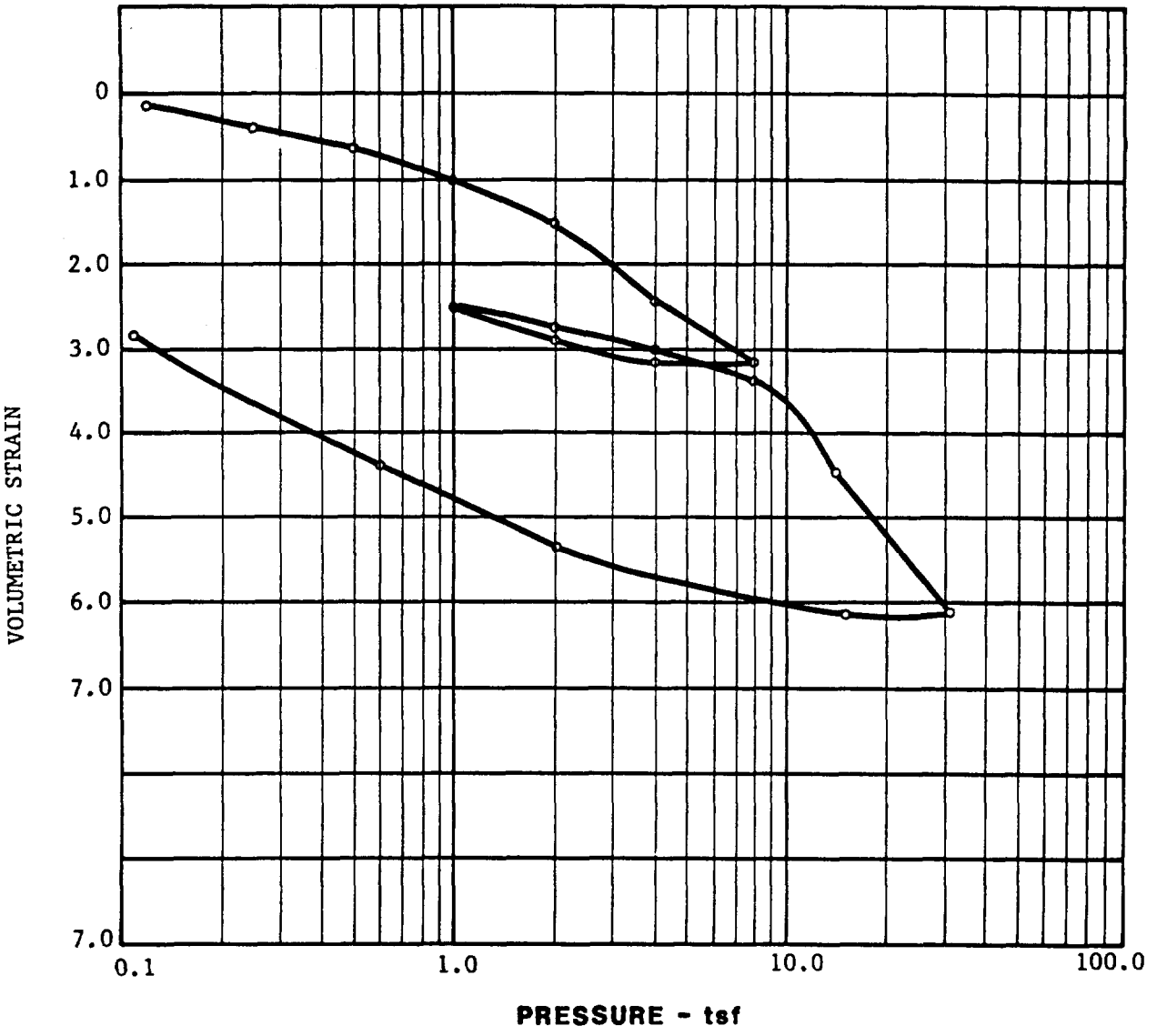
DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 11-29-85	FIGURE NO: B-8

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

BORING NO.	SAMPLE DEPTH	CLASSIFICATION
B-5	12 ft.	Gray, clayey SILT (ML)



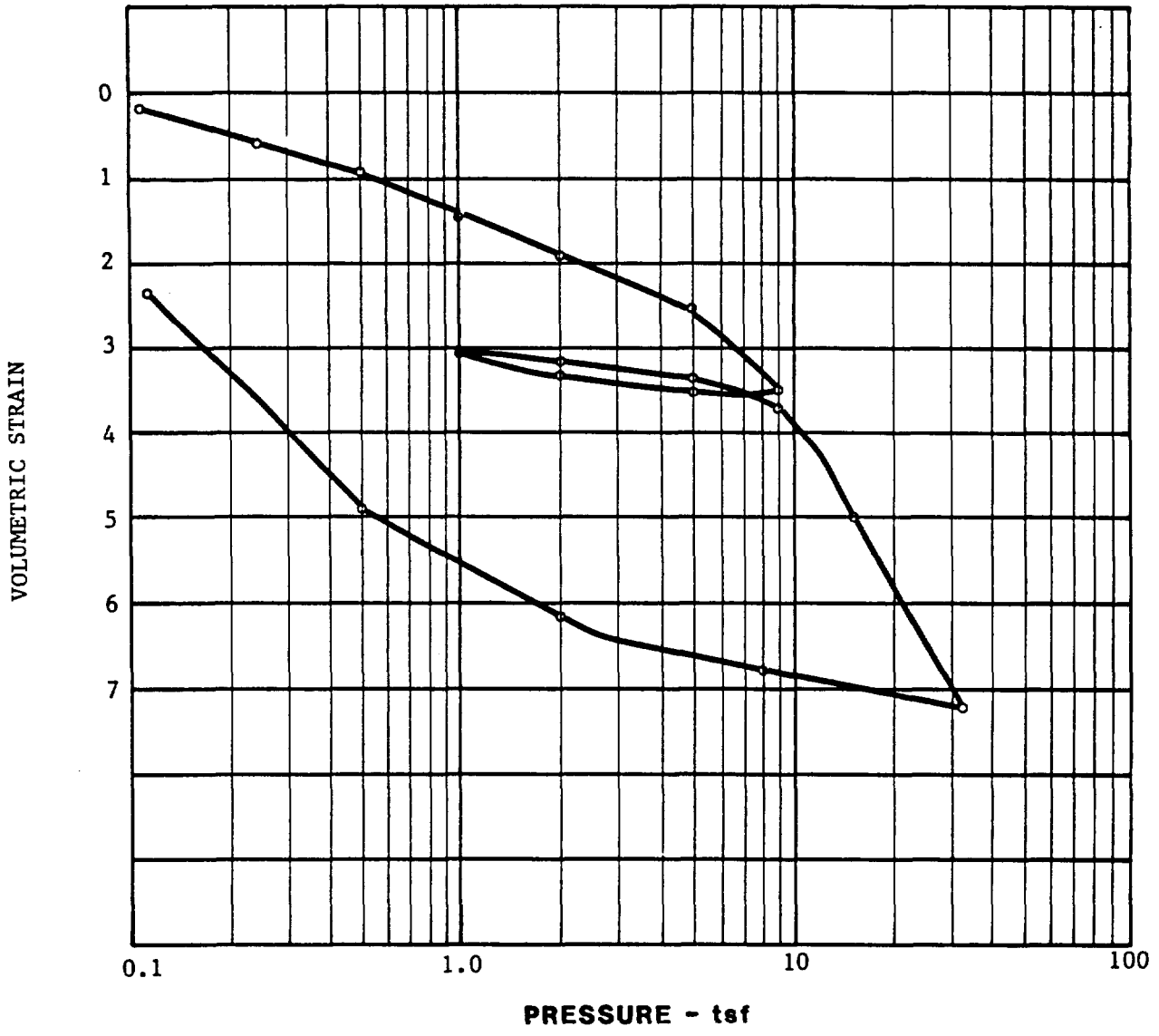
Initial Dry Density, pcf	120.3	Specific Gravity of Solids	2.80
Initial Water Content, %	14.9	Initial Void Ratio, e_o	0.452
Initial Saturation, %	92.3	Compression Index, C_c	0.055
Final Dry Density, pcf		Swell Index, C_s	0.008
Final Water Content, %	15.1	Effective Overburden Pressure, P'_o, tsf	0.47
Final Saturation, %	100.0	Maximum Past Pressure, P_c, tsf	5.0

CONSOLIDATION TEST

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM	CHECKED BY: JAM	PROJECT NO: 85C7101	DATE: 12-13-85	FIGURE NO: B-9

BORING NO.	SAMPLE DEPTH	CLASSIFICATION
B-5	22 ft.	Gray, clayey SILT (ML)



Initial Dry Density, pcf	116.3	Specific Gravity of Solids	2.80
Initial Water Content, %	18.0	Initial Void Ratio, e_o	0.502
Initial Saturation, %	100.0	Compression Index, C_c	0.070
Final Dry Density, pcf		Swell Index, C_s	0.007
Final Water Content, %	16.8	Effective Overburden Pressure, P_o', tsf	0.75
Final Saturation, %	98.6	Maximum Past Pressure, P_c, tsf	6.0

CONSOLIDATION TEST

DIAMOND SHAMROCK CORPORATION - ASHTABULA, OHIO

DRAWN BY: REM	CHECKED BY: JAM	PROJECT NO: 85C7101-2	DATE: 12-13-85	FIGURE NO: B-10

Appendix C

CHAIN OF CUSTODY RECORD

CLIENT:				FIELD PERSONNEL:	
PROJECT NO: 85C7101				Steve Sittler, Jim Morrison	
WELL NO.	SAMPLE NUMBER	DATE	TIME	ANALYSES REQUIRED	
B-1	S-1	10-30-85		Carbon Tetrachloride	12165
B-1	S-2	"		" "	12166
B-1	S-3	"		" "	12167
B-2	S-1	10-31-85		" "	12168
B-2	S-2	"		" "	12169
B-2	S-3	"		" "	12170
B-3	S-1	10-31-85		" "	12171
B-3	S-2	"		" "	12172
B-3	S-3	"		" "	12173

Relinquished by:	Received by:	Date Time
Relinquished by:	Received by:	Date Time
Relinquished by:	Received by:	Date Time

Dispatched by:	Date Time	Received at Laboratory by:	Date Time
Steven P. Sittler	11/11/85	Cindi C. Reed	11/12/85 11:15

Name & Address of Laboratory:

Woodward-Clyde Consultants

CHAIN OF CUSTODY RECORD

CLIENT:				FIELD PERSONNEL:	
PROJECT NO: 85C7101				STEVE SITTLER	
WELL NO.	SAMPLE NUMBER	DATE	TIME	ANALYSES REQUIRED	
B-4	S-1	11-4-85		CARBON TETRACHLORIDE	12174
B-4	S-2	"		" "	12175
B-4	S-3	"		" "	12176
B-4	S-4	"		" "	12177
B-4	S-5	"		" "	12178
B-5	S-1	11-1-85		" "	12179
B-5	S-2	"		" "	12180
B-5	S-3	"		" "	12181
B-5	S-4	"		" "	12182
B-6	S-1	10-31-85		" "	12183
B-6	S-2	"		" "	12184
B-6	S-3	"		" "	12185

Relinquished by:	Received by:	Date Time
Relinquished by:	Received by:	Date Time
Relinquished by:	Received by:	Date Time

Dispatched by:	Date Time	Received at Laboratory by:	Date Time
Steven P. Sittler	11/11/85	Lori L. Reed	11/12/85 11:15

Name & Address of Laboratory:

Woodward-Clyde Consultants

CHAIN OF CUSTODY RECORD

CLIENT:				FIELD PERSONNEL:	
PROJECT NO: 85C7101				STEVE SITTLER	
WELL NO.	**SAMPLE NUMBER**	**DATE**	**TIME**	**ANALYSES REQUIRED**	
P-1	S-1	11-6-85		CARBON TETRACHLORIDE	12186
P-1	S-2	"		" "	12187
P-1	S-3	"		" "	12188
P-2	S-1	11-6-85		" "	12189
P-2	S-2	"		" "	12190
P-2	S-3	"		" "	12191
P-3	S-1	11-1-85		" "	12192
P-3	S-2	"		" "	12193
P-3	S-3	"		" "	12194
P-4	S-1	11-5-85		" "	12195
P-4	S-2	"		" "	12236
P-4	S-3	"		" "	12237

Relinquished by:	**Received by:**	**Date Time**
Relinquished by:	**Received by:**	**Date Time**
Relinquished by:	**Received by:**	**Date Time**

Dispatched by:	**Date Time**	**Received at Laboratory by:**	**Date Time**
Steven P. Sittler	11/11/85	Lori L. Reed	11/12/85 11:15

Name & Address of Laboratory:

Woodward-Clyde Consultants

CHAIN OF CUSTODY RECORD

CLIENT: DIAMOND SHAMROCK PROJECT NO: 85C7101				FIELD PERSONNEL: STEVE SITTLER	
WELL NO.	SAMPLE NUMBER	DATE	TIME	ANALYSES REQUIRED	
P-5	S-1	11-1-85		CARBON TETRACHLORIDE	12196
P-5	S-2	11-1-85		" "	12197
P-5	S-3	"		" "	12198
P-6	S-1	11-5-85		" "	12238
P-6	S-2	"		" "	12239
P-6	S-3	"		" "	12240
P-7	S-1	11-5-85		" "	12199
P-7	S-2	"		" "	12200
P-7	S-3	"		" "	12201
P-8	S-1	11-5-85		" "	12202
P-8	S-2	"		" "	12203
P-8	S-3	"		" "	12204

Relinquished by:	Received by:	Date Time
Relinquished by:	Received by:	Date Time
Relinquished by:	Received by:	Date Time

Dispatched by:	Date Time	Received at Laboratory by:	Date Time
Steven P. Sittler	11/11/85	Lori L. Reed	11/12/85 11:15

Name & Address of Laboratory:

Woodward-Clyde Consultants

CHAIN OF CUSTODY RECORD

CLIENT: DIAMOND SHAMROCK PROJECT NO: 8507101				FIELD PERSONNEL: STEVE SITTLER	
WELL NO.	SAMPLE NUMBER	DATE	TIME	ANALYSES REQUIRED	
P-9	S-1	11-5-85		CARBON TETRACHLORIDE	12205
P-9	S-2	"		" "	12206
P-9	S-3	"		" "	12207
P-10	S-1	11-5-85		" "	12208
P-10	S-2	"		" "	12209
P-10	S-3	"		" "	12210
P-11	S-1	11-5-85		" "	12211
P-11	S-2	"		" "	12212
P-11	S-3	"		" "	12213
P-12	S-1	11-5-85		" "	12214
P-12	S-2	"		" "	12215
P-12	S-3	"		" "	12216

Relinquished by:	Received by:	Date Time
Relinquished by:	Received by:	Date Time
Relinquished by:	Received by:	Date Time

Dispatched by:	Date Time	Received at Laboratory by:	Date Time
Steven P. Sittler	11/11/85	Lori L. Reed	11/14/85 11:15

Name & Address of Laboratory:

Woodward-Clyde Consultants

CHAIN OF CUSTODY RECORD

CLIENT: DIAMOND SHAMROCK PROJECT NO: 85C7101				FIELD PERSONNEL: STEVE SITTLER	
WELL NO.	SAMPLE NUMBER	DATE	TIME	ANALYSES REQUIRED	
P-13	S-1	11-5-85		CARBON TETRACHLORIDE	12217
P-13	S-2	"		" "	12218
P-13	S-3	"		" "	12219

Relinquished by:	Received by:	Date Time
Relinquished by:	Received by:	Date Time
Relinquished by:	Received by:	Date Time

Dispatched by: Steven P. Sittler	Date Time 11/11/85	Received at Laboratory by: Lisa C. Reed	Date Time 11/14/85	11:15

Name & Address of Laboratory:

Woodward-Clyde Consultants

CHAIN OF CUSTODY RECORD

CLIENT: DIAMOND SHAMROCK PROJECT NO: 85C7101				FIELD PERSONNEL: STEVE SITTLER, CHUCK SIEGEL	
WELL NO.	SAMPLE NUMBER	DATE	TIME	ANALYSES REQUIRED	
MW-1	S-1	11-11-85	12:00 Noon	CARBON TETRACHLORIDE	12158
MW-1	S-1	"	"	" "	
MW-2	S-2	"	12:15 pm	" "	12159
MW-2	S-2	"	"	" "	
MW-3	S-3	"	1:00 pm	" "	12160
MW-3	S-3	"	"	" "	
MW-4	S-4	"	12:45 pm	" "	12161
MW-4	S-4	"	"	" "	
MW-5	S-5	"	12:40 pm	" "	12162
MW-5	S-5	"	"	" "	

Relinquished by:	Received by:	Date Time
Relinquished by:	Received by:	Date Time
Relinquished by:	Received by:	Date Time

Dispatched by: Steven P. Sittler	Date Time	Received at Laboratory by: Lori L. Reed	Date Time 11-12-85 11:15

Name & Address of Laboratory:

Woodward-Clyde Consultants

CHAIN OF CUSTODY RECORD

CLIENT: DIAMOND SHAMROCK PROJECT NO: 85C7101				FIELD PERSONNEL: STEVE SITTLER, CHUCK SIEGEL
WELL NO.	SAMPLE NUMBER	DATE	TIME	ANALYSES REQUIRED
MW-6	S-6	11-11-85	12:30pm	CARBON TETRACHLORIDE 12163
MW-6	S-6	"	"	" "
MW-7	S-7	"	12:50pm	" " 12164

Relinquished by:	Received by:	Date Time
Relinquished by:	Received by:	Date Time
Relinquished by:	Received by:	Date Time

Dispatched by: Steven P. Sittler	Date Time	Received at Laboratory by: Lori L. Reed	Date Time 11/12/85 11:15

Name & Address of Laboratory:

Woodward-Clyde Consultants

CHAIN OF CUSTODY RECORD

CLIENT: Diamond Shamrock PROJECT NO: 85C7101				FIELD PERSONNEL: J.A Morrison. C.E. Siegle
WELL NO.	**SAMPLE NUMBER**	**DATE**	**TIME**	**ANALYSES REQUIRED**
MW-1	1	12-3	4:00 pm	Volitile Priority Pollutants
	2			
MW-2	1			
	2			
MW-3	1			
	2			
MW-4	1			
	2			
MW-5	1			
	2			
MW-6	1			
	2			

Relinquished by:	Received by:	Date Time
Relinquished by:	Received by:	Date Time
Relinquished by:	Received by:	Date Time

Dispatched by: James A Morrison	Date Time: 12-3 4:30	Received at Laboratory by: Kathy Fleming	Date Time: 12/4 11:00 am

Name & Address of Laboratory:
Aqua Tech Environmental Laboratory - Belmont Ohio

Woodward-Clyde Consultants

OhioEPA
State Of Ohio Environmental Protection Agency

Northeast District Office
2110 E. Aurora Road; Twinsburg, Ohio 44087-1969

(216) 425-9171

Richard F. Celeste, Governor

File
DIA. Shamrock

January 29, 1986

Re: NPDES PERMIT NO. 3IF00002

49

Mr. James N. Taylor
Regulatory Affairs Supervisor
Diamond Shamrock Chemicals Company
Ashtabula Plant
P.O. Box 488
Ashtabula, Ohio 44004

Dear Mr. Taylor:

This letter is intended to provide additional clarification with regard to our discussions concerning the Ashtabula Plant's treatment of hexavalent and trivalent chromium contamination in the contents of the plant's north reservoir. The release of ammonium dichromate at the time of the January 17th accident has reportedly resulted in approximately one million gallons of wastewater in the north reservoir to be contaminated with approximately 6 ppm of hexavalent chromium.

As we discussed, Diamond Shamrock is proposing to clean up the lagoon contamination by temporarily setting up a chrome reduction/removal system utilizing ferrous sulfate. Effluent from this system would be discharged to Fields Brook via the plant's NPDES permitted outfall. Although not specifically authorized by the above referenced permit, we have no objection to you discharging this treated wastewater provided that Ohio Water Quality Standards for hexavalent and trivalent chromium are not violated in Fields Brook.

I have requested Bob Davic of our Division of Water Quality Monitoring and Assessment to calculate water quality based effluent limits for these parameters, and the enclosed IOC provides a summary of his calculations. Although the suggested limits of 486 ug/l for hex chromium and 4,063 ug/l for tri chromium are listed as 30 day average allowable values, we are requesting that Diamond Shamrock use these values as daily maximum effluent values. We are also requesting that composite samples of the effluent be collected on a daily basis during the first two weeks of operation and twice weekly thereafter. Results from these samplings may be attached and submitted with the monthly operating reports.

Should you have any questions or comments regarding the above, please contact me.

Sincerely,

Martin A. Hildvsky
Environmental Scientist
Industrial Wastewater

MAH:mjo
Enclosure

cc: R. Phelps, IWW, CO
R. Wysenski, DWQMA, NEDO
Kris Coder, DSHMM, NEDO
Ken Harsh, ERS, CO
Thomas Stano, Diamond Shamrock
Pasadena, TX

inter-office communication

to: Marty Hilovsky, IWW date: 1-28-86

from: B.D. Bob Davic, DWQMA

subject: Allowable discharge of Tri and Hex chromium for Diamond Shamrock, FieldsBrook
(temporary Feb - Apr. Discharge limits)

Justification Data

1. Fields Brook Discharge (Minimum CFS, Feb - Apr.) at Diamond outfall

	Feb.	Mar.	Apr.	Method
Fields Brook Natural CFS	2.09	2.99	1.17	a
Upstream industrial discharge CFS	18.08	18.08	18.08	b
Minimum Monthly discharge (CFS)	20.17	21.07	19.25	
Average CFS (Feb.-Apr.)	20.2			

2. Fields Brook Hardness (as $CaCO_3$)

- Based on 1985 Feb - Apr.

OEPA grab samples at 15th Street

Average Hardness = 833 mg/l

3. Water Quality Standards

a. Hex - chromium = 10 Vg/l non hardness based (30 day average)

b. Tri - chromium = 178 ug/l, 30 day average at Hardness of 833

Footnotes:
a. Calculated from Basin yield data at Ashtabula River USGS gage. Assume 4.5 mi^2 Fields Brook drainage area at Diamond discharge

b. Industrial flow valves from May 10, 1984 letter sent to IWW, OEPA from SCM Corp.

4. Mass Balance Equation

$$CP = \frac{(STD)\ (QP + QR) - (QR)\ (CR)}{QP}$$

CP= Allowable Plant Conc.

Where (STD) = WQS (10 ug/l - Hex; 178 UG/L - TRI)

QP = Plant Flow (.7736 CFS = .5 mgd)

QR = Stream Flow (20.2 CFS) 13.06

CR = Upstream Conc. (29. ug/l)

30-day average allowable plant discharges(c,d,e)

Hex = 486 ug/l
Chromium

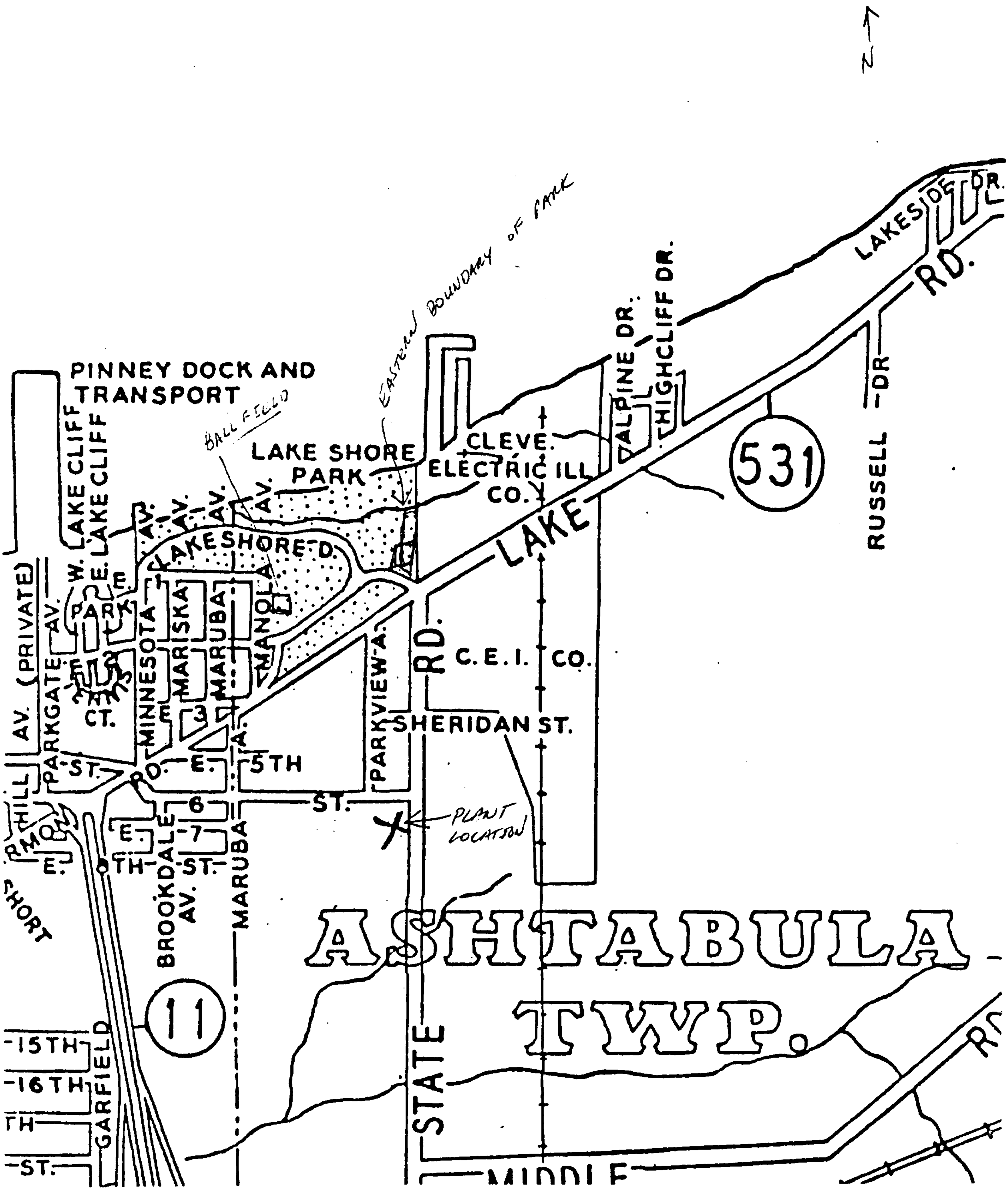
Tri = 4,063 ug/l
Chromium

---

c. No WQS exist for total chromium

d. These effluent limits are only valid for months of February through April.

e. Diamond discharge must meet WQS for both Hex and Tri chromium


N
PINNEY DOCK AND TRANSPORT
BALL FIELD
EASTERN BOUNDARY OF PARK
LAKE SHORE PARK
CLEVE. ELECTRIC ILL CO.
C.E.I. CO.
LAKE RD.
531
RUSSELL DR
LAKESIDE DR.
ALPINE DR.
HIGHCLIFF DR.
STATE RD.
SHERIDAN ST.
PARKVIEW A.
LAKESHORE D.
W. LAKE CLIFF
E. LAKE CLIFF
MINNESOTA AV.
MARISKA AV.
MARUBA AV.
MANOLA AV.
PARKGATE AV.
AV. (PRIVATE)
E. 5TH
E. 6 ST.
E. 7
E. 8TH ST.
BROOKDALE AV.
MARUBA
MANOLA
11
15TH
16TH
GARFIELD
ASHTABULA TWP.
PLANT LOCATION
MIDDLE

OhioEPA INITIAL POLLUTION INCIDENT REPORT 19 86

File

I.D. Number 1-4-0132

Time & Date Reported 1250 1-17-86 Discovered 1000-1100 1/17/86 Occurred 1000-1100 1/17/86

Reported by (Name & Position) Tom STREVG - C D'Amand Shamrock

Telephone 713-476-1405 Did Spiller Report? Company yes X no ____ Complaint ____ yes X no

Suspected Spiller D'Amand Shamrock

Mailing Address Middle & State Roads Ashtabula Co.

Product Spilled Ammonium dichromate & Chromium Trioxide Type: C

Approximate Amount (Duration) 1 ton + Size: L Priority: I

Source of Spill explosion reactor vat blew up Areas Affected: A W S G None

Waterway Affected Land / Air maybe Fields Brook Weather ____

Location (County & City) Ashtabula Co. Ashtabula

(Street Location) Middle Road

RECEIVED

JAN 23 1986

OHIO EPA-N.E.D.O

Did You Tell Spiller To Call The N.R.C.? X yes ____ no (1-800-424-8802, Washington D.C.)

COMMENTS AND FOLLOW-UP INFORMATION

Bob Buckler, Rose Powers

FD- 216 997-5276 Ashtabula Twp.

Chief 1-216 997-4641 " " PIC - man on site -

Read Many Injured Green Cloud released

Power off at plant -

Ammonium dichromate $(NH_4)_2Cr_2O_7$ TLV 0.1 mg/m³ fire risk -

used in Fireworks - TLV 0.1 mg/m³

breaks down to Chromium trioxide CrO_3 - needs to be contained a site -

DSA, SO, PD, others on scene, Bruce on way, Dept. Hygiene also on way -

Stockyard

TELEPHONE RECORD

District Office NE	Talked to Bruce Mitlo	Time & Date 1255 1/17/86	
Water Supply 98307) DSA- Jim Williamson Lockhart -	Talked to ~~Mike Schaefer~~	Time & Date	
18 DSA Ashtabula Co 216-275-0760	Talked to Pete Brunt Dennis Bush	Time & Date 1620 1/17/86 1320 1/17/86	
District Engineer USEPA	Talked to Rose Power Paul Inzano	Time & Date 1335 1/17/86	
ODNR (night: 265-7006)	Talked to Chris Cedar	Time & Date 1/17/86 1330	
DSHWM CC to →	Talked to Chris Co.	Time & Date Chris Bruce.	
~~ODH~~ (866-6361 USEPA Eckhardt 202-225-6331 2 Congress Ave	Talked to Fire Controller Jack Rowe	Time & Date 1405 1/17/86	
ODH (5190) "Industrial Hygiene 216-797-0015	Talked to Len Huffman	Time & Date	
PIC (8508) Al Franks 263-0220: Home	Talked to Carol	Time & Date 1320 1/17	
SFM (864-5519)	Talked to Lloyd Kazmarek	Time & Date 1315 1/17/86	
Local FD or PD, Ash Tabula Co SD	Talked to Ashtabula Fd	Time & Date 1610 1/17/86	
Ashtabula PD	Talked to Dispatcher 1316	Time & Date 1/17/86	
Ashtabula DSA Director's office.	Talked to Dispatcher 1315 Secretary left Message	Time & Date 1/17/86	

Follow-up

Business ____ yes ____ no

District ____ yes ____ no

Received by Kim 1/17/86

TSS ____ yes Chem no

EPA 0300

2 of 2

OhioEPA INITIAL POLLUTION INCIDENT REPORT 19 86

I.D. Number 1-4-0132

Time & Date Reported _____ Discovered _____ Occurred _____

Reported by (Name & Position) _____

Telephone _____ Did Spiller Report? _____ yes _____ no _____ Complaint _____ yes _____ no

Suspected Spiller Di'Anna Shamrock

Mailing Address _____

Product Spilled _____ Type: _____

Approximate Amount (Duration) _____ Size: _____ Priority: I

Source of Spill _____ Areas Affected: A L S G None

Waterway Affected _____ Weather _____

Location (County & City) _____

(Street Location) State Road

Did You Tell Spiller To Call The N.R.C.? _____ yes _____ no (1-800-424-8802, Washington D.C.)

COMMENTS AND FOLLOW-UP INFORMATION

2-3 people dead now Structural damage to building - roads roped closed - winds 15 mph from south - material is contained on plant property - ??

might be some off site -

- winds maybe easterly - need to check off site

Rotary dryer Blew up - (was not operating) at Fibre

Ed Noble (Cleveland) Tom Stray (Howard)

- SAFety - Dick Hammond, Gary Scale

Ind. Hyg. - this pm Bob Kadish

TELEPHONE RECORD

District Office NE	Talked to Jim Arn	Time & Date	1400/16 1/17/86
Water Supply 98307)	Talked to _____	Time & Date	_____
District Engineer 22. Sam Boggs - informed. via Bruce.	Talked to _____	Time & Date	1/21
ODNR (night: 265-7006)	Talked to _____	Time & Date	_____
DSHWM	Talked to _____	Time & Date	_____
ODA (866-6361 Di'Anna Shamrock	Talked to _____	Time & Date	_____
ODH (5190)	Talked to Vern Hegel	Time & Date	1525 1/17/86
	Talked to Debbie Cook	Time & Date	1615 1/17/86
	Talked to Irene Little	Time & Date	1510 1/17/86
MIC (8508) Al Franks 263-0220: Home USEPA	Talked to _____	Time & Date	_____
SFM (864-5510)	Talked to _____	Time & Date	_____
Local FD or PD	Talked to _____	Time & Date	_____
& [redacted] OSA	Talked to Tom Williams	Time & Date	1455 1/17/86
USEPA	Talked to Rick Horner	Time & Date	1510 1/17/86
202-475-8600	WASH. DC. DIV. CERCLA		

Received by _____

Follow-up

Business _____ yes _____ no

District _____ yes _____ no

TSS _____ yes _____ no

EPA 0300

17 < 72

OhioEPA INITIAL POLLUTION INCIDENT REPORT 19 86

I.D. Number 1-4-0132

Time & Date Reported _____ Discovered _____ Occurred _____

Reported by (Name & Position) _____

Telephone _____ Did Spiller Report? _____ yes ____ no ____ Complaint ____ yes ____ no

Suspected Spiller D'Amand Shamrock

Mailing Address _____

Product Spilled _____ Type: _____

Approximate Amount (Duration) _____ Size: _____ Priority: _____

Source of Spill _____ Areas Affected: A L S G None

Waterway Affected _____ Weather _____

Location (County & City) _____

(Street Location) _____

Did You Tell Spiller To Call The N.R.C.? _____ yes _____ no (1-800-424-8802, Washington D.C.)

COMMENTS AND FOLLOW-UP INFORMATION

Saturday night Tom Stang @ Holiday Inn Austintown 216-275-2711 Rm 154 OH hired for clean-up (Chamber very busy)
OH has just started on clean-up - coroner has released them -
Sampled: Out Fall, runoff in front of Building, Soil close to stock road
At Fence line (some found @ that point), sample at Gate to Park,
front of stacks @ RMD, and @ CEI and east of CEI.
Will pump treated material to lagoon, 25 ppb in small runoff
Have been making APC only since December 1985 - New process
media update throughout weekend
Had General permit APC - R&D pilot scale plant - question about Air permit -

TELEPHONE RECORD

District Office NE	Talked to _____	Time & Date _____
Water Supply 98307)	Talked to _____	Time & Date _____
District Engineer D'Amand Shamrock 216-992-3200 216-992-3206	Talked to Marty Hilovsky	Time & Date 1533 1/24/86 1530 1/20/86
ODNR (night: 265-7006)	Talked to _____	Time & Date _____
DSHWM	Talked to _____	Time & Date _____
ODA (866-6361)	Talked to _____	Time & Date _____
~~Rick Hor~~ USEPA 703-258-3324	Talked to Rick Hovnar	Time & Date 2000 1/28/86
ODH (5190)	Talked to _____	Time & Date _____
PIC (8508) Al Franks 263-0220: Home	Talked to 2030	Time & Date 1/17/86
SFM (864-5510)	Talked to _____	Time & Date _____
Local FD or PD	Talked to _____	Time & Date _____
Tom Stang D'Amand Bob Adams Shamrock	Talked to 2220-2300	Time & Date 1/18/86
Ed Nuble Concerned About	Talked to _____ permit 2000	Time & Date _____

Follow-up

Business Y yes _____ no

District Y yes _____ no

Received by [signature] 1/17/86

TSS Chem yes Y no

EPA 0300

Diamond Shamrock
Chemicals Company

Ashtabula Plant

50

July 18, 1985

Technical Records Section
Ohio Environmental Protection Agency
P. O. Box 1049
Columbus, Ohio 43216

RE: Ashtabula Plant
NPDES Monitoring Report
Permit No. 3IF00002001
Application No. OH0029149

Gentlemen:

As per the Toxic Organic Pollutant Provisions section of our NPDES permit, we had Environmental Testing and Certification Corporation (ETC) in Edison, NJ, analyze monthly samples of our final effluent. Attached as Appendix-A is a summary of the toxic organic pollutant monitoring results for April-June, 1985. Also attached are the actual lab results (Appendix-B) and a list of processes that were operating during the sampling periods (Appendix-C).

Appendix-D contains the results of ETC's attempt to identify and quantify peaks on the total ion plots for the April sample that were more than 10 times adjacent peak-to-peak background noise. ETC was unable to identify the two unknown peaks found in the volatiles fraction and one unknown peak in the acid fraction using their library of mass spectra. The peaks identified in the acid and base/neutral fractions are compounds that we don't use or produce.

During the quarter four products were manufactured which generate wastewater which we believe to contain hazardous organic chemicals. In all cases we followed our standard procedure of hauling this wastewater to an approved vendor for treatment and safe disposal. We believe this practice continues to minimize the discharge of toxic pollutants from our plant effluent. Those processes operated in this manner are listed in Appendix-C.

Appendix-E is a summary of our CCl_4 sampling program to date. We plan to install several sampling wells in the suspected source area, east of the process building, to determine the extent of the problem and then pump from one or more of the wells to try and reduce or eliminate the CCl_4 getting into the effluent.

If you have any questions concerning this report, please contact Fred Leitert or me at (216) 992-3200.

Sincerely,
DIAMOND SHAMROCK CHEMICALS COMPANY

James N. Taylor
Regulatory Affairs Supervisor
Ashtabula Plant

mjf

Attachments

CC: G. Amendola - USEPA, Westlake
M. Hilovsky - OEPA, Twinsburg

DIAMOND SHAMROCK CHEMICALS COMPANY
ASHTABULA PLANT

APPENDIX-A

PRIORITY POLLUTANTS SAMPLING PROGRAM

Sample Date:	April 4/15/85 ug/l	May 5/22/85 ug/l	June 6/4/85 ug/l
Volatiles			
Carbon tetrachloride	863	241	212
Chloroform	103	55	46
Dichlorobromomethane	6	BMDL	ND
Ethylbenzene	ND	BMDL	ND
Methylene chloride	7	9	3
Tetrachloroethylene	6	ND	5
Toluene	BMDL	ND	ND
1,2-Trans-Dichloroethylene	BMDL	BMDL	ND
1,1,2-Trichloroethane	22	7	7
Trichloroethylene	19	23	16
Trichlorofluoromethane	BMDL	ND	ND
Acids			
None			
Base Neutral			
Di-n-Butyl Phthalate	BMDL	—	—

ND = None Detected
BMDL = Below Method Detection Limit

Effluent

APPENDIX-B

Lab Results for Priority Pollutant Scans

ETC ENVIRONMENTAL TESTING and CERTIFICATION

APR 26, 1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Volatile Compounds - GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
H3205	DIAMOND SHAMROCK CORPORATION	DSCASHGWM	03IF0002001	850415	0800	24

NPDES Number	Compound (Acrolein and Acrylonitrile values are screen only.)	Results: Sample Concen. ug/l	Results: MDL ug/l a	QC Replicate: First ug/l	QC Replicate: Second ug/l	QC Blank and Spiked Blank: Blank Data ug/l	QC Blank and Spiked Blank: Concen. Added ug/l	QC Blank and Spiked Blank: % Recov	QC Matrix Spike: Unspiked Sample ug/l	QC Matrix Spike: Concen. Added ug/l	QC Matrix Spike: % Recov
1V	Acrolein	ND	100.0	ND	ND	ND	800	83	ND	800	114
2V	Acrylonitrile	ND	100.0	ND	ND	ND	80	105	ND	80	89
3V	Benzene	ND	4.4	ND	ND	ND	18	101	ND	18	98
4V	bis(Chloromethyl)ether	ND	10.0	ND	ND	ND	0	-	ND	0	-
5V	Bromoform	ND	4.7	ND	ND	ND	18	95	ND	18	102
6V	Carbon tetrachloride	862.6	2.8	ND	ND	ND	18	104	8	18	69
7V	Chlorobenzene	ND	6.0	ND	ND	ND	18	100	ND	18	99
8V	Chlorodibromomethane	ND	3.1	ND	ND	ND	18	104	5	18	112
9V	Chloroethane	ND	10.0	ND	ND	ND	18	97	ND	18	104
10V	2-Chloroethylvinyl ether	ND	10.0	ND	ND	ND	18	106	ND	18	104
11V	Chloroform	102.8	1.6	ND	ND	ND	18	102	251	18	131
12V	Dichlorobromomethane	5.8	2.2	ND	ND	ND	18	101	28	18	[illegible]
13V	Dichlorodifluoromethane	ND	10.0	ND	ND	ND	18	96	ND	18	1
14V	1,1-Dichloroethane	ND	4.7	ND	ND	ND	18	101	9	18	[illegible]
15V	1,2-Dichloroethane	ND	3.0	ND	ND	ND	18	102	ND	18	105
16V	1,1-Dichloroethylene	ND	2.8	ND	ND	ND	18	99	1	18	99
17V	1,2-Dichloropropane	ND	6.0	ND	ND	ND	18	100	ND	18	99
18V	cis-1,3-Dichloropropylene	ND	5.0	ND	ND	ND	18	93	ND	18	102
19V	Ethylbenzene	ND	7.0	ND	ND	ND	18	88	ND	18	86
20V	Methyl bromide	ND	10.0	ND	ND	ND	18	140	ND	18	140
21V	Methyl chloride	ND	10.0	ND	ND	ND	18	93	ND	18	93
22V	Methylene chloride	7.2	2.8	ND	ND	6	18	59	ND	18	75
23V	1,1,2,2-Tetrachloroethane	ND	7.0	ND	ND	ND	18	96	ND	18	119
24V	Tetrachloroethylene	6.0	4.1	ND	ND	ND	18	106	ND	18	104
25V	Toluene	BMDL	6.0	ND	ND	ND	18	103	ND	18	100
26V	1,2-Trans-dichloroethylene	BMDL	1.6	2	3	ND	18	97	3	18	96
27V	1,1,1-Trichloroethane	ND	4.0	7	7	4	18	85	30	18	99
28V	1,1,2-Trichloroethane	21.6	5.0	ND	ND	ND	18	101	ND	18	108
29V	Trichloroethylene	18.8	1.9	2	2	BMDL	18	107	26	18	93
30V	Trichlorofluoromethane	BMDL	10.0	ND	ND	ND	18	103	ND	18	104
31V	Vinyl chloride	ND	10.0	ND	ND	ND	18	98	ND	18	95
18V	trans-1,3-Dichloropropylene	ND	10.0	ND	ND	ND	18	98	ND	18	99

a EPA published Method Detection Limit.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

MAY 11, 1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Acid Compounds - GC/MS Analysis Data (QR02)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
H3205	DIAMOND SHAMROCK CORPORATION	DSCASHGWM	03IF0002001	850415	0800	24

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL ug/l a	First ug/ml	Second ug/ml	Blank Data ug/ml	Concen. Added ug/ml	% Recov	Unspiked Sample ug/ml	Concen. Added ug/ml	% Recov
1A	2-Chlorophenol	ND	3.3	ND	ND	ND	100	102	ND	100	102
2A	2,4-Dichlorophenol	ND	2.7	ND	ND	ND	100	100	ND	100	105
3A	2,4-Dimethylphenol	ND	2.7	ND	ND	ND	100	12b	ND	100	6
4A	4,6-Dinitro-o-cresol	ND	24.0	ND	ND	ND	100	92	ND	100	99
5A	2,4-Dinitrophenol	ND	42.0	ND	ND	ND	100	77	ND	100	90
6A	2-Nitrophenol	ND	3.6	ND	ND	ND	100	96	ND	100	94
7A	4-Nitrophenol	ND	2.4	ND	ND	ND	100	107	ND	100	121
8A	p-Chloro-m-cresol	ND	3.0	ND	ND	ND	100	75	ND	100	71
9A	Pentachlorophenol	ND	3.6	ND	ND	ND	100	95	ND	100	100
10A	Phenol	ND	1.5	ND	ND	ND	100	105	ND	100	105
11A	2,4,6-Trichlorophenol	ND	2.7	ND	ND	ND	100	97	ND	100	97

a EPA published Method Detection Limit.

b Recovery normally low using EPA Protocol Method 625.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

APR 29, 1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
H3205	DIAMOND SHAMROCK CORPORATION	DSCASHGWM	031F0002001	850415	0800	24

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
1B	Acenaphthene	ND	1.9	ND	ND	ND	100	79	ND	100	76
2B	Acenaphthylene	ND	3.5	ND	ND	ND	100	80	ND	100	76
3B	Anthracene	ND	1.9	ND	ND	ND	100	70	ND	100	73
4B	Benzidine	ND	44.0	ND	ND	ND	100	29	ND	100	38
5B	Benzo(a)anthracene	ND	7.8	ND	ND	ND	100	77	ND	100	72
6B	Benzo(a)pyrene	ND	2.5	ND	ND	ND	100	115	ND	100	88
7B	Benzo(b)fluoroanthene	ND	4.8	ND	ND	ND	100	99	ND	100	92
8B	Benzo(ghi)perylene	ND	4.1	ND	ND	ND	0	-	ND	0	-
9B	Benzo(k)fluoranthene	ND	2.5	ND	ND	ND	100	103	ND	100	68
10B	bis(2-Chloroethoxy)methane	ND	5.3	ND	ND	ND	100	65	ND	100	57
11B	bis(2-Chloroethyl) ether	ND	5.7	ND	ND	ND	100	51	ND	100	48
12B	bis(2-Chloroisopropyl)ether	ND	5.7	ND	ND	ND	100	92	ND	100	70
13B	bis(2-Ethylhexyl)phthalate	ND	10.0	5	3	ND	100	49	ND	100	56
14B	4-Bromophenyl phenyl ether	ND	1.9	ND	ND	ND	100	68	ND	100	59
15B	Butyl benzyl phthalate	ND	10.0	ND	ND	ND	100	35	ND	100	46
16B	2-Chloronaphthalene	ND	1.9	ND	ND	ND	100	70	ND	100	66
17B	4-Chlorophenyl phenyl ether	ND	4.2	ND	ND	ND	100	121	ND	100	1[illegible]
18B	Chrysene	ND	2.5	ND	ND	ND	100	76	ND	100	[illegible]
19B	Dibenzo(a,h)anthracene	ND	2.5	ND	ND	ND	0	-	ND	0	-
20B	1,2-Dichlorobenzene	ND	1.9	ND	ND	ND	100	66	ND	100	52
21B	1,3-Dichlorobenzene	ND	1.9	ND	ND	ND	100	61	ND	100	46
22B	1,4-Dichlorobenzene	ND	4.4	ND	ND	ND	100	55	ND	100	41
23B	3,3'-Dichlorobenzidine	ND	16.5	ND	ND	ND	100	103	ND	100	70
24B	Diethyl phthalate	ND	10.0	ND	ND	ND	100	9[c]	ND	100	26[c]
25B	Dimethyl phthalate	ND	10.0	ND	ND	ND	100	0[c]	ND	100	3[c]
26B	Di-n-butyl phthalate	BMDL	10.0	5	ND	ND	100	48[c]	ND	100	64[c]
27B	2,4-Dinitrotoluene	ND	5.7	ND	ND	ND	100	72	ND	100	68
28B	2,6-Dinitrotoluene	ND	1.9	ND	ND	ND	100	84	ND	100	83
29B	Di-n-octyl phthalate	ND	10.0	ND	ND	ND	100	44	ND	100	37
30B	1,2-Diphenylhydrazine	ND	10.0	ND	ND	ND	100	36	ND	100	31
31B	Fluoranthene	ND	2.2	ND	ND	ND	100	87	ND	100	104
32B	Fluorene	ND	1.9	ND	ND	ND	100	84	ND	100	80

ETC ENVIRONMENTAL TESTING and CERTIFICATION

APR 29.

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
H3205	DIAMOND SHAMROCK CORPORATION	DSCASHGWM	03IF0002001	850415	0800	24

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL ug/l a	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	
33B	Hexachlorobenzene	ND	1.9	ND	ND	ND	100	91	ND	100	
34B	Hexachlorobutadiene	ND	.9	ND	ND	ND	100	144	ND	100	10
35B	Hexachlorocyclopentadiene	ND	10.0	ND	ND	ND	0	-	ND	0	
36B	Hexachloroethane	ND	1.6	ND	ND	ND	100	89	ND	100	4
37B	Indeno(1,2,3-c,d)pyrene	ND	3.7	ND	ND	ND	0	-	ND	0	
38B	Isophorone	ND	2.2	ND	ND	ND	100	41	ND	100	3
39B	Naphthalene	ND	1.6	ND	ND	ND	100	74	ND	100	6
40B	Nitrobenzene	ND	1.9	ND	ND	ND	100	34	ND	100	2
41B	N-Nitrosodimethylamine	ND	10.0	ND	ND	ND	0	-	ND	0	
42B	N-Nitrosodi-n-propylamine	ND	10.0	ND	ND	ND	100	26	ND	100	22
43B	N-Nitrosodiphenylamine	ND	1.9	ND	ND	ND	100	74	ND	100	70
44B	Phenanthrene	ND	5.4	ND	ND	ND	100	73	ND	100	74
45B	Pyrene	ND	1.9	ND	ND	ND	100	87	ND	100	107
46B	1,2,4-Trichlorobenzene	ND	1.9	ND	ND	ND	100	199	ND	100	111

A EPA published Method Detection Limit.

B ETC established Method Detection Limit for this particular sample.

C Recovery normally low using EPA Protocol Method 625.

MAY 30, 198

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Volatile Compounds - GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
H6838	DIAMOND SHAMROCK CORPORATION	DSCASHGWM	03IF0002001	850522	0900	

NPDES Number	Compound (Acrolein and Acrylonitrile values are screen only.)	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL ug/l a	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen Added ug/l	% Reco
1V	Acrolein	ND	100.0	ND	ND	ND	800	114	ND	800	8
2V	Acrylonitrile	ND	100.0	ND	ND	ND	80	113	ND	80	11
3V	Benzene	ND	4.4	ND	ND	ND	18	117	ND	18	11
4V	bis(Chloromethyl)ether	ND	10.0	ND	ND	ND	0	-	ND	0	
5V	Bromoform	ND	4.7	ND	ND	ND	18	98	ND	18	10
6V	Carbon tetrachloride	240.6	2.8	ND	ND	ND	18	114	241	18	11
7V	Chlorobenzene	ND	6.0	ND	ND	ND	18	119	ND	18	12
8V	Chlorodibromomethane	ND	.3.1	ND	ND	ND	18	116	ND	18	12
9V	Chloroethane	ND	10.0	ND	ND	ND	18	114	ND	18	12
10V	2-Chloroethylvinyl ether	ND	10.0	ND	ND	ND	18	123	ND	18	14
11V	Chloroform	55.2	1.6	ND	ND	ND	18	117	55	18	11
12V	Dichlorobromomethane	BMDL	2.2	ND	ND	ND	18	115	2	18	11
13V	Dichlorodifluoromethane	ND	10.0	ND	ND	ND	0	-	ND	0	
14V	1,1-Dichloroethane	ND	4.7	ND	ND	ND	18	115	ND	18	12
15V	1,2-Dichloroethane	ND	2.8	ND	ND	ND	18	124	ND	18	14
16V	1,1-Dichloroethylene	ND	2.8	ND	ND	ND	18	112	ND	18	11
17V	1,2-Dichloropropane	ND	6.0	ND	ND	ND	18	114	ND	18	11
18V	cis-1,3-Dichloropropylene	ND	5.0	ND	ND	ND	18	107	ND	18	10
19V	Ethylbenzene	BMDL	7.2	ND	ND	ND	18	122	1	18	12
20V	Methyl bromide	ND	10.0	ND	ND	ND	18	100	ND	18	12
21V	Methyl chloride	ND	10.0	ND	ND	ND	18	105	ND	18	11
22V	Methylene chloride	9.0	2.8	4	ND	8	18	55	9	18	14
23V	1,1,2,2-Tetrachloroethane	ND	6.9	ND	ND	ND	18	125	ND	18	13
24V	Tetrachloroethylene	ND	4.1	ND	ND	9	18	74	ND	18	13
25V	Toluene	ND	6.0	ND	ND	BMDL	18	112	ND	18	12
26V	1,2-Trans-dichloroethylene	BMDL	1.6	ND	ND	ND	18	110	2	18	11
27V	1,1,1-Trichloroethane	ND	3.8	ND	ND	BMDL	18	102	ND	18	12
28V	1,1,2-Trichloroethane	7.1	5.0	ND	ND	ND	18	125	7	18	12
29V	Trichloroethylene	22.8	1.9	2	1	ND	18	113	23	18	10
30V	Trichlorofluoromethane	ND	10.0	5	5	ND	18	113	ND	18	11
31V	Vinyl chloride	ND	10.0	ND	ND	ND	18	111	ND	18	11
18V	trans-1,3-Dichloropropylene	ND	10.0	ND	ND	ND	18	102	ND	18	10

a EPA published Method Detection Limit.

B Recovery normally variable using EPA Protocol Method 624.

JUN 12, 1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Volatile Compounds - GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

H8246 DIAMOND SHAMROCK CORPORATION DSCASHGWM 03IF0002001 850604 0835

ETC Sample No. | Company | Facility | Sample Point | Date | Time | Elapsed Hours

NPDES Number	Compound (Acrolein and Acrylonitrile values are screen only.)	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL ug/l A	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
1V	Acrolein	ND	100.0	ND	ND	ND	800	78	ND	800	78
2V	Acrylonitrile	ND	100.0	ND	ND	ND	80	83	ND	80	73
3V	Benzene	ND	4.4	ND	ND	ND	18	98	208	18	233.
4V	bis(Chloromethyl)ether	ND	10.0 C	ND	ND	ND	0	-	ND	0	-
5V	Bromoform	ND	4.7	ND	ND	ND	18	83	ND	18	83
6V	Carbon tetrachloride	212.5	2.8	ND	ND	ND	18	25	ND	18	98
7V	Chlorobenzene	ND	6.0	ND	ND	ND	18	96	ND	18	103
8V	Chlorodibromomethane	ND	3.1	ND	ND	ND	18	93	ND	18	91
9V	Chloroethane	ND	10.0 C	ND	ND	ND	18	93	139	18	170.
10V	2-Chloroethylvinyl ether	ND	10.0 C	ND	ND	ND	18	95	ND	18	59
11V	Chloroform	45.9	1.6	ND	ND	ND	18	101	1760	18	241.
12V	Dichlorobromomethane	ND	2.2	ND	ND	ND	18	95	ND	18	101
13V	Dichlorodifluoromethane	ND	10.0	ND	ND	ND	18	172.	ND	18	170.
14V	1,1-Dichloroethane	ND	4.7	ND	ND	ND	18	96	395	18	374.
15V	1,2-Dichloroethane	ND	2.8	ND	ND	ND	18	98	1428	18	180.
16V	1,1-Dichloroethylene	ND	2.8	ND	ND	ND	18	93	46	18	107
17V	1,2-Dichloropropane	ND	6.0	ND	ND	ND	18	96	ND	18	102
18V	cis-1,3-Dichloropropylene	ND	5.0	ND	ND	ND	18	93	ND	18	107
19V	Ethylbenzene	ND	7.2	ND	ND	ND	18	100	ND	18	11
20V	Methyl bromide	ND	10.0 C	ND	ND	ND	18	103	ND	18	109
21V	Methyl chloride	ND	10.0	ND	ND	ND	18	74	ND	18	75
22V	Methylene chloride	2.9	2.8	ND	ND	7	18	88	75	18	116.
23V	1,1,2,2-Tetrachloroethane	ND	6.9	ND	ND	ND	18	78	ND	18	90
24V	Tetrachloroethylene	5.1	4.1	ND	ND	ND	18	102	4	18	96
25V	Toluene	ND	6.0	ND	ND	ND	18	92	5	18	89
26V	1,2-Trans-dichloroethylene	ND	1.6	ND	ND	ND	18	93	672	18	156.
27V	1,1,1-Trichloroethane	ND	3.8	ND	ND	4	18	94	ND	18	98
28V	1,1,2-Trichloroethane	7.2	5.0	ND	ND	ND	18	97	36	18	114
29V	Trichloroethylene	16.5	1.9	ND	ND	ND	18	101	34	18	110
30V	Trichlorofluoromethane	ND	10.0	ND	ND	ND	18	95	3	18	98
31V	Vinyl chloride	ND	10.0	ND	ND	ND	18	90	139	18	164.
18V	trans-1,3-Dichloropropylene	ND	10.0	ND	ND	ND	18	94	ND	18	92

A EPA published Method Detection Limit.

B Spiked samples that contain compounds present at high levels do not provide valid spike recovery data.

C ETC established Method Detection Limit for this particular sample.

D Recovery normally variable using EPA Protocol Method 624.

DIAMOND SHAMROCK CHEMICALS COMPANY
ASHTABULA PLANT

APPENDIX-C

PROCESSES IN OPERATION DURING SAMPLING PERIOD*

	April	May	June
Processes with Wastewater Discharged to Effluent System			
Methylmonochloroacetate	x	x	x
CAPCURE® 3-800 (Polymercaptan)	x	x	x
SM-2 (Teflon Fibrids)	x	x	x
Processes with Wastewater Trucked to off-site Disposal			
CAPCURE® 3-800 (Polymercaptan)	x	x	x
Glycerol Formal	-	x	x
Tetrachlorocatechol	x	x	x
Acrylyl Chloride	x	-	-
Processes without Wastewater Discharge			
COOL-PHOS® "L"	x	x	-
DACROMET® 200A	x	x	x
DACROMET® 200C	x	x	x
DACROMET® 320 A/B	x	x	x
DACROMET® 320 C	-	x	-
DACROMET® 500 A/B	-	x	-
M-CLENE® 1A	-	x	-

* Includes 7 day period prior to sampling.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

June 27, 1985

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Volatile Fraction (QR06)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
J0480	DIAMOND SHAMROCK CORPORATION	DSCASHGWM	0 3IF0002001	850415	0800	24

Compound Name	Data			Identifiers				
	Scan Number	Retention Time (Min)	M.W.	CAS Number	Empirical Formula	Conc µg/l		
1 Unknown	196	8.65	-	-	-	30		
2 Unknown	290	12.30	-	-	-	150		

ETC ENVIRONMENTAL TESTING and CERTIFICATION

June 27, 1985

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds - GC/MS Analysis Data - Acid Fraction (QR07)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
J0480	DIAMOND SHAMROCK CORPORATION	DSCASHGWM	0 31F0002001	850415	0800	24

	Compound Name	Data: Scan Number	Data: Retention Time (Min)	Data: M.W.	Identifiers: CAS Number	Identifiers: Empirical Formula	Conc µg/l		
1	1-propene, 1,1,2-trichloro	78	4.38	144	21400259	$C_3H_3Cl_3$	12		
2	Unknown	280	7.98	-	-	-	14		

ETC ENVIRONMENTAL TESTING and CERTIFICATION

June 27, 1985

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds – GC/MS Analysis Data – Base/Neutral Fraction (QR08)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
J0480	DIAMOND SHAMROCK CORPORATION	DSCASHGWM	0 3IF0002001	850415	0800	24

	Compound Name	Data			Identifiers				
		Scan Number	Retention Time (Min)	M.W.	CAS Number	Empirical Formula	CONC µg/l		
1	Ethene, tetrachloro-	51	3.70	164	127184	C_2Cl_4	31		

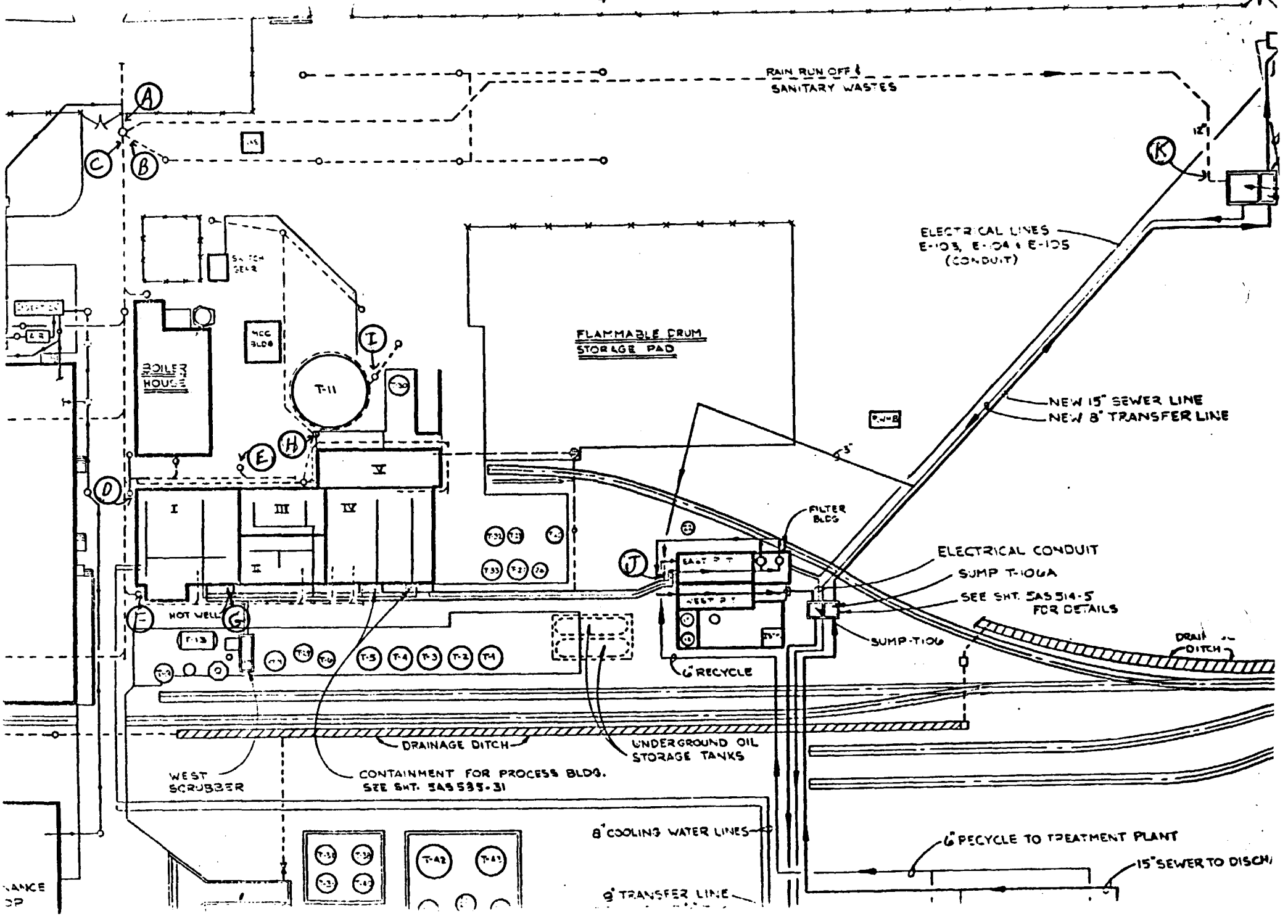
DIAMOND SHAMROCK CHEMICALS COMPANY
ASHTABULA PLANT

APPENDIX-E

CCl_4 Sampling Results

Sample Point	Date	PPB CCl_4
A. From sanitary plant	2/16/84	10
	6/20/84	30
B. Parking lot drains	2/16/84	100
	3/21/84	100
	6/20/84	300
C. Tank area, alleys and roof drains	2/16/84	20
	3/21/84	100
	6/20/84	900
D. Roof & process steam	2/26/85	30
E. Roof & alley drains	2/26/85	30
F. Roof & alley drains	2/26/85	20
G. Hot well	11/17/83	10
H. Tank area drains	2/26/85	2,500
	3/29/85	1,000
I. Driveway & tank area drains	9/19/84	1,100
	10/17/84	10,000
	1/10/85	20
	2/26/85	1,400
	3/29/85	700
J. Line from rain sump to east pit	11/16/83	800
	4/2/84	500
K. Inlet to rain sump	11/17/83	300
	2/3/84	800
	3/21/84	100
	4/2/84	100
	6/20/84	900
	2/26/85	500

CCl_4 SAMPLING POINTS



Diamond Shamrock
Chemicals Company

Ashtabula Plant

51

February 24, 1986

RECEIVED

FEB 25 1986

OHIO EPA-N.E.D.O.

Mr. Martin Hilovsky
Division of Industrial Wastewater
Ohio Environmental Protection Agency
2110 East Aurora Road
Twinsburg, Ohio 44087

RE: Diamond Shamrock Chemicals Company
Ashtabula Plant
NPDES Permit No. 3IF00002001
Application No. OH0029149

Dear Mr. Hilovsky:

This is to confirm my phone conversation with Steve Love of your group on February 20, 1986. At that time I reported an unauthorized discharge of water from our plant property.

Sometime on 2/19/86 the PVC discharge line and valve from our containment ditch froze and broke. This allowed the water being pumped from the north rain sump to the effluent ponds to short-circuit to the containment ditch which has been shut off since the explosion on 1/17/86. The water in the containment ditch reached a high enough level to start flowing through the ballast for our railroad tracks. We sampled the ditch for chrome and found it to be between 50 and 100 ppb hexavalent chrome. Early on 2/20/86 the manual gate valve on the ditch was opened and approximately 70,000 gallons was discharged to lower the water level and relieve the pressure on the track roadbed. This water flowed off the south end of our property along normal stormwater runoff channels.

Per our discussion and agreement with Steve, we sampled both ends and the middle of the ditch for chrome (hexavalent chrome - 50 to 80 ppb, total chrome - 80 to 170 ppb). We then discharged the remaining water in the ditch (approximately 70,000 gallons) through the gate valve so we could repair the broken line.

If you have any questions, please contact me.

Sincerely,

DIAMOND SHAMROCK CHEMICALS COMPANY

J. N. Taylor
Regulatory Affairs Supervisor
Ashtabula Plant

mjc

CC: F. C. Leitert - DSCC, Ashtabula, OH
T. J. Stang - DSCC, Pasadena, TX